State Agencies

Table B-2. State Agencies

Submission Number	Commenter Name
3059	Washington Department of Fish and Wildlife
2823	Washington State Department of Health
2691	Washington State Department of Natural Resources
2734	Washington State Department of Transportation
3311	Washington Utilities and Transportation Commission

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Southwest Region 5 • 2108 Grand Boulevard, Vancouver, WA 98661
Telephone: (360) 696-6211 • Fax: (360) 906-6776

June 13, 2016

Millennium Bulk Terminals EIS, c/o ICF International
710 Second Avenue, Suite 550
Seattle, WA 98104

RE: Department of Fish and Wildlife Comments on the Millennium Bulk Terminals - Longview DEIS

To Whom It May Concern:

Thank you for the opportunity to comment on the Millennium Bulk Terminals-Longview Draft Environmental Impact Statement (DEIS). We understand the importance of this decision-making process and offer comments based on potential impacts to fish and wildlife resources. We will break down our comments into four subject areas:

1. Increased rail traffic impacts,
2. Increased vessel traffic impacts,
3. On-site construction impacts, and,
4. Climate change

As you know, a decision of this magnitude has many long-lasting implications for the natural resources and socio-economics of this region. Our agency promotes the numerous benefits healthy ecosystems provide to our statewide economy.

The Columbia River sustains a major commercial and recreational fishery of international importance, and provides many local jobs to industries that depend on its scenic, cultural, and recreational benefits. We understand the delicate balance that decision-makers must strike in order to ensure that all factors that affect Washington's quality of life are considered. We hope you will find the attached comments helpful in informing this decision-making process.

If you have any questions about this correspondence, please contact Dave Howe at (360) 906-6729.

Sincerely,

Guy Norman
Regional Director
Washington Department of Fish and Wildlife

Increased Rail Traffic Impacts
We thank the applicant for the analysis of impact to wildlife due to increased rail traffic and coal transport. The study concludes that at full buildout in 2028, the project proposes to increase rail traffic by an additional 16 trains/ day. Section 5.1.8 states:

> "Without improvements to increase capacity, the Reynolds Lead; BNSF Spur; and three segments on the BNSF main line routes in Washington State (Idaho/Washington State Line–Spokane, Spokane–Pasco, and Pasco–Vancouver) are not projected to have the capacity to handle the projected baseline rail traffic and Proposed Action-related rail traffic in 2028. BNSF could address capacity issues with capital improvements or operational changes, but it is unknown when these actions would be taken or permitted. Therefore, with existing infrastructure and using the methods to identify potential baseline rail traffic in 2028, the Proposed Action could result in a <u>significant adverse environmental impact</u> on rail transportation."

This study does not contemplate what these capital improvements may be or where they may occur. Southwest Washington has had a history of rail improvements that have impacted category 1 wetlands, and high functioning, fish bearing rivers and streams. The potential significant adverse environmental impact of a rail buildout to support operations is a topic that requires more research at this phase of the proposed project.

The document includes references to the likely increase in wildlife strikes associated with the increased rail traffic. However, the plan addressing or monitoring this impact is lacking clarity. Currently, this section recommends monitoring for train/wildlife strikes, monitoring the population level impact of these strikes, and at a later undefined date, possibly implementing mitigation. Specifically, section 4.8.7.2 should include more robust language, and a detailed discussion regarding mitigation that addresses avoidance, minimization, and compensatory mitigation as necessary.

While this section addresses several wildlife impacts, there is limited information regarding the loss of connectivity, disturbance, and landscape barrier impacts that the rail lines have on the environment. This impact should be more adequately recognized and appropriate mitigation strategies should be designed as part of project approval, not at an undefined time in the future.

Increased Vessel Traffic Impacts
Vessel traffic impacts are a significant portion of the proposed project activity, and subsequently have a large potential impact on aquatic species. We would like to thank the applicant for the thorough impact assessment for increased vessel traffic impacts to aquatic species. Section 5.4.5.1 states:

> "The Proposed Action would load an average of 70 vessels per month or 840 vessels per year, which would equate to 1,680 vessel transits in the Columbia River. At maximum throughput, an average of 70 vessels per month (an average of over two per day) would be loaded at Docks 2 and 3. The berths for Docks 2 and 3 are expected to be occupied by Proposed Action-related vessels 365 days per year. Increased vessel traffic could result

> in changes in wake patterns, increased propeller wake, and increased underwater noise, and vessel emissions that could affect other environmental resources. In general, the increase in deep-draft vessels associated with the Proposed Action would result in the increased potential for vessel-related impacts to occur."

While this document contains a vast amount of information, the potential impacts are unclear. The impacts from wake stranding throughout the lower Columbia River are growing in clarity, as has mitigation deemed necessary for such impacts. Due to the environmental, social, recreational and economic impacts that vessel traffic could have on the region, the agency recommends additional analysis on wake stranding and the daily number of ships on-site both berthing and anchored. In addition, greater impacts to commercial fisheries should be analyzed including mainstem and Select Area Fisheries Evaluations, experimental fisheries and recreational fisheries in the proximate area.

The study area proposed should be expanded to include the Washington coast expected to be traveled by cumulative vessel and rail traffic during operation of the proposed project. Although the DEIS discusses the potential impact on pinnipeds in the Columbia River, it fails to include any analysis of increased potential for impacts on cetaceans caused by increased vessel traffic after they leave the river and enter the Pacific. It is well known that the Columbia River Bar is one of the most dangerous shipping channels on the west coast. Daily crossings of the bar during storms can pose risks not only to vessels, but to the estuary environment if there is a spill. A spill of this type could be difficult to entirely contain due to challenging maritime conditions in the area. The estuary is an important nursery and foraging area for a myriad of fish and wildlife species. Expansion of the study area will allow for more accurate projected impacts to Marine Protection Zones, the outer Washington coastline and designated vessel routes; allowing for more improved understanding of overall cumulative impacts to species and their habitat.

On-site Construction Impacts

We would like to thank the applicant for the thorough impact assessment for construction and operation impacts to aquatic species at the project site. Section 4.7.5.1 explains project-related activities and their direct or indirect impact to aquatic species.

Upon review of the "Fish Fact Sheet" in comparison with this section, there is disagreement in the number of proposed pilings, from 610 to 630 on-site. Please provide clarity on specifics such as these pilings in future documents so impacts may be concluded and mitigated properly.
The siting of this facility is a topic that the agency requests more information on. This is due to our lack of clarity on the analysis on location of the terminal and potential alternatives. A concise analysis on the terminal location's impacts to mitigation sequencing, migration corridors, impacts to fish life and aquatic vegetation, and siting that it is in deep water areas to avoid and/or minimize the need for dredging is requested.

On-site impacts can minimized with a concise in water work window for construction. The agency requests discussion on setting the in water work window, and offers consultation on this topic as the project staging continues. In addition, we support the removal of creosoted pilings by vibratory hammer as proposed.

Dredging activities throughout the lower Columbia River are providing further insight on both short and long term impacts to aquatic environments and species. For example, in water disposal for clean material is the preferred method as expressed by the agency. We do recommend a more robust study of cumulative impacts on dredging in the Lower Columbia River as part of the proposed project impacts to the region.

Specifics on topics such as initial dredging, and maintenance dredging intervals and quantities, as well as a study on slope instability in regards to regrade and expansion of the dredge area; these are important pieces in the determination of impacts and responsible mitigation. We request more information on the topics of dredging on-site and its larger cumulative impacts on the region in the formation of a mitigation package. The department offers consultation on the determination of appropriate mitigation.

On-site construction and development are discussed appropriately in Section 4.8. The documents underplay however the loss of available habitat by the destruction of 24 acres of productive wetland on the project site, which is host to a diverse host of species and ecological communities important to the area and region. This includes the great pacific flyway, a corridor for migrating birds. An analysis on the impacts above and beyond avoidance and minimization is requested in order to effectively discuss mitigation needs for the impacts to species and environments from on-site construction.

Climate Change

Section 5.8.2.4, page 5-8-25 adequately describes projected impacts from climate change, but focuses almost exclusively on economic impacts to the region. The one exception seems to be the paragraph on ocean acidification, which acknowledges the potentially significant effect on shellfish and other organisms. WDFW recommends including a more robust discussion of the impacts climate change will have on the fish and wildlife of Washington, as well as the important economic value it serves our state and region. Climate impacts are expected to affect ecosystems, species and habitats in at least six key ways. These include the degradation and loss of habitat, increase in major ecosystem disturbances, shifts in geographical ranges of some native plants and animals, change in timing of life history events for species, declines in species population and the loss of biodiversity, and the spread of invasive species and disease. These impacts have large ramifications for our region's social, economic and environmental viability in the future. WDFW suggests referencing "State of Knowledge Report: Climate Change Impacts and Adaptation in Puget Sound", prepared by the Climate Impacts Group in 2016 in further analysis of this topic and the discussion appropriate mitigation for project impacts.

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL PUBLIC HEALTH
PO Box 47820 • Olympia, Washington 98504-7820
(360) 236-3000 • TTY Relay Service: (800) 833-6388

June 13, 2016

Millennium Bulk Terminals – Longview SEPA EIS
c/o ICF International
710 Second Avenue, Suite 550
Seattle, Washington 98104

U.S. Army Corps of Engineers
Washington Department of Ecology
Cowlitz County Commission

Subject: Comments on the Draft Environmental Impact Statement for Millennium Bulk Terminals, Longview LLC Coal Export Terminal

Thank you for the opportunity to comment on the draft environmental impact statement (DEIS) for the proposed Millennium Bulk Terminal in Longview, Washington. As the state health department, we are interested in the impact this project will have on the health and well-being of people in Washington State. We recognize that noise, traffic, air pollution, greenhouse gas emissions contributing to climate change, and the risks of spills or derailments could negatively impact public health. We also recognize the project could impact social determinants of health such as employment, education, and transportation. With this project we are particularly concerned about the greenhouse gas emissions under the Department of Ecology's model and the associated public health impacts of climate change in Washington State. We would also like to thank you for the cumulative impacts section: it adds value to the discussion of fossil fuel transportation in the state beyond the local implications of the Millennium Bulk Terminal. We have recommendations for reducing potential negative public health impacts of the Millennium Terminal. They are summarized here and explained in more detail below. Please contact us if you have any questions or if you would like to collaborate on solutions.

Summary of Recommendations:

- Estimate the public health impacts of climate change from greenhouse gas (GHG) emissions and design appropriate mitigations.
- Coordinate with emergency responders for medical (ambulance and fire), environmental (flood, earthquake, etc.), and rail related emergencies, and design mitigations that correct for the increased risk of Kelso–Longview residents.

- Develop mitigations to reduce the total Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), and Particulate Matter ($PM_{2.5}$) emissions. Kelso–Longview residents already have worse than average asthma health outcomes and this project will be the largest contributor of criteria pollutants in the county.
- Install air quality monitors for NO_2 and SO_2 near the project site prior to construction and operation. Base final EIS air quality projections on real, rather than modeled, data.
- Post anti-idling signage at the most severely affected intersections, such as the project access at 38th Avenue and Weyerhaeuser access at Washington Way.
- Electrify the port to reduce emissions from ships idling or "hoteling" at the port.
- Change the vehicle safety metric to crashes involving fatalities and serious injuries. This better aligns with Washington State's traffic safety goals. We further recommend that the project make investments in the intersections identified as having risks of greater than 0.04 accidents per year that are sufficient to support Washington State's Target Zero goal.

Greenhouse Gas Emissions Leading to Climate Change

The Washington State Department of Ecology (ECY) used a broad scope when calculating total greenhouse gas emissions from the project. From a public health perspective, we believe this is the appropriate scope because of the global nature of climate change. To put the greenhouse gas emissions from this project in context, over a 20 year period ECY estimated that GHG emissions would be 35 million tons of CO_2.

ECY is also working at the direction of Governor Inslee on a Clean Air Rule that would reduce Washington State's GHG emissions by approximately 120 million tons over 20 years by regulating the emissions of approximately 30 companies. Based upon ECY's *most likely* estimate, the Millennium Bulk Terminal project would erase a quarter of those GHG gains. If market conditions were favorable for coal, the project could completely neutralize the GHG reductions for the Clean Air Rule.

The DEIS discusses some of the impacts of climate change on Washington State such as rainfall, flooding, snowpack, and wildfires, but it does not discuss the impact those changes will have on health. The Washington State Department of Health (DOH) has identified ongoing and projected public health impacts of climate change for the residents of Washington State. The report is available in Appendix A. Some climate change impacts that will detract from the public's health are increased ozone and $PM_{2.5}$ concentrations, risk of vibrio from shellfish, and increased vector-borne and zoonotic diseases.

Recommendation: Estimate the public health impacts of climate change from GHG emissions and design appropriate mitigations. Mitigation measures should use the Washington Clean Air Rule as a guide for assuring real, permanent, and measurable offsets.

Emergency Response

At the request of our emergency response team at DOH, the Washington Tracking Network created a Social Vulnerability to Hazards Index to identify populations at increased risk during emergencies due to the built environment and social and demographic characteristics.[1] Six census tracts in the Longview–

[1] Washington Tracking Network, Washington Department of Health. Web. "Information by Location: Social Vulnerability to Hazards". Retrieved June 6, 2016, from
(see next page for continuation of footnote)

Kelso city center rank in the highest risk category for social vulnerability to hazards (10/10). These high risk census tracts are in close proximity to rail routes within the city centers.

Recommendation:

Coordinate with emergency responders for medical (ambulance and fire), environmental (flood, earthquake, etc.), and rail related emergencies, and design mitigations that correct for the increased risk of this population.

Air Pollution

Surveillance data suggests that populations near the project site are at greater risk for respiratory illness than the state population as a whole. In 2010-2015, asthma hospitalizations in Washington were 6.22 per 100,000 people. In the two zip codes nearest the project site (98623 and 98626), asthma hospitalization rates were 11.73 and 9.00, respectively. These rates are statistically significantly higher than the state average. Some census tracts near the project site also have higher than average cardiovascular disease and cancer deaths rates, both conditions that can be related to air quality. In addition, access to care is limited in these populations: insurance rates in the Longview-Kelso area are lower than the state average.

The proposed Millennium Bulk Terminal project will not exceed National Ambient Air Quality Standards (NAAQS). It will bring the area significantly closer to the NAAQS levels for 1-hour NO_2, SO_2, and $PM_{2.5}$. NO_2, SO_2, and $PM_{2.5}$ are criteria pollutants regulated under the federal Clean Air Act because of their impacts on human health and regional air quality impacts. The air quality assessment in the DEIS indicates that these three pollutants are the most likely to cause exceedances in the project site due to background levels plus contributions from activities at the site (Tables 5.67–5.6-8). Modeled 1-hour concentrations of NO_2 predict levels at 83 percent of the existing standard, SO_2 levels at 73 percent of the existing standard, and $PM_{2.5}$ 24-hour levels are predicted to be 85 percent of the existing standard. **This represents a 2.7 fold increase in NO_2, a nearly 10 fold increase in SO_2, and a 1.5 fold increase in $PM_{2.5}$.** These pollutants are lung irritants and can exacerbate asthma and other respiratory diseases and contribute to heart disease resulting in more hospital admissions. Air quality projections do not predict exceedances of air quality standards for these pollutants. However, these predictions were based almost exclusively on modeled data (with the exception of $PM_{2.5}$) where actual air quality monitoring of criteria pollutants would be preferable.

Recommendations:

- Accommodate worse than the state average respiratory health in the Kelso–Longview area, and to mitigate the prospect of being the greatest contributor of criteria air pollutants in the county, the applicant should develop mitigations to reduce the total NO_2, SO_2, and $PM_{2.5}$ emissions.
- Install air quality monitors for criteria pollutants other than $PM_{2.5}$ near the project site before construction and operation to collect real ambient air quality data. Base final EIS air quality projections on measured instead of modeled data.

---

http://www.doh.wa.gov/DataandStatisticalReports/EnvironmentalHealth/WashingtonTrackingNetworkWTN/InformationbyLocation.

- Post anti-idling signage at the most severely affected intersections such as the project access at 38th Avenue and Weyerhaeuser access at Washington Way.
- Electrify the port to reduce emissions from ships idling or "hoteling" at the port.

Vehicle Transportation

The vehicle transportation section uses level of service, queuing, and vehicle safety as performance measures. Washington State's Traffic Safety Commission and Department of Transportation have collaborated on Target Zero, a plan that aims to reduce fatalities and serious injuries from crashes to zero by 2030. According to data obtained from the Washington State Department of Transportation and the Washington Traffic Safety Commission, all census tracts between downtown Vancouver and the Millennium site have fatality and serious injury rates in the top 30 percent of Washington State census tracts.

Recommendation:

Change the vehicle safety metric to crashes involving fatalities and serious injuries. This better aligns with Washington State's traffic safety goals. We further recommend that the project make investments in the intersections identified as having risks of greater than 0.04 accidents per year that are sufficient to support Washington State's Target Zero goal.

If you have any questions, please contact Rad Cunningham at (360) 236-3359 or rad.cunningham@doh.wa.gov.

Sincerely,

Clark Halvorson
Assistant Secretary

Attachment

Appendix A: Health Impacts of Climate Change in Washington State

Authors: Hilary Browning, Research Investigator; Denise LaFlamme, Epidemiologist; Jerry Borchert, Marine Biotoxin Lead; Joan Hardy, Toxicologist; Clara Hard, Shellfish Illness Coordinator; Elizabeth Dykstra, Entomologist; and Ginny Stern, Hydrogeologist

Summary of Findings, Research, or Data

Heat Waves

Background and public health impact

- There will be a direct public health impact from increasing air temperatures due to climate change. Elevated air temperature is a risk factor for a number of heat-related illnesses including heat cramps, heat exhaustion, and heat stroke.
- Warm nighttime temperatures are more strongly associated with adverse health outcomes than are warm daytime temperatures (Gershunov et al. 2009; Kalkstein and Davis 1989). It has been proposed that elevated overnight lows hamper physiological recovery from daytime heat.

Observations

- Both maximum and minimum air temperatures are predicted to increase in response to climate change. Already, from 1951 to 2010, there was an average increase of 0.6°C (1.08°F) in global maximum daily temperatures. Global minimum daily temperatures increased even more–by 0.8°C (1.44°F), on average (Donat and Alexander 2012).
- In the Pacific Northwest, the frequency of nighttime heat waves has increased over time (Bumbaco et al. 2013).
- A study by the Climate Impacts Group (CIG) found from 1980–2006 in Washington State, the risk of death from non-traumatic[2] and circulatory[3] causes was statistically significantly ($P < 0.05$) elevated for all ages on most days of a heat event (Jackson et al. 2010).

Projections

- The CIG projects that by 2085 there will be between 107 and 988 additional excess heat-related deaths per year in Seattle, and between 17 and 76 excess deaths in Eastern Washington (Spokane, Tri-Cities, and Yakima) (Jackson et al. 2010).

Vulnerability

- Residents of the Pacific Northwest are particularly vulnerable to heat waves because of the rarity of this type of weather. Kalkstein and Davis (1989) determined that the "threshold" temperature for adverse health impacts for the Pacific Coast was only 30°C (86°F), compared to 43°C (109.4°F) for Phoenix and Las Vegas.

---

[2] ICD-9: 001-799; ICD-10: A00-R99
[3] ICD-9: 390-459; ICD-10:I00-I99, G45, G46

- General risk factors for heat-related mortality and morbidity include urban living, low socioeconomic standing, young or old age, and not practicing preventative behaviors. These risk factors are reviewed in depth in McGeehin and Mirabelli (2001).

Air Pollution

Background and public health impact

- Climate change is expected to worsen air quality in the United States mainly due to increases in ozone and particulate matter air pollution in some areas (Luber et al. 2014).
- Ozone is the main contributor to smog and is produced from the interaction of sunlight with nitrous oxides (NOx) and volatile organic compounds (VOCs). Ozone air pollution mainly occurs in urban areas during warm summer months.
- Ozone has been associated with chest pain, aggravating bronchitis, emphysema and asthma, reduced lung function, inflammation of airways, and increased susceptibility to respiratory infections.
- Smoke contributes to particulate matter air pollution, especially fine particulate air pollution (less than 2.5 microns in diameter ($PM_{2.5}$)).
- $PM_{2.5}$ air pollution has been linked with a variety of health problems including decreased lung function, increased respiratory symptoms including asthma symptoms, nonfatal heart attacks, irregular heartbeat, and premature death in people with heart or lung disease.

Observations

- $PM_{2.5}$ air concentrations (as 24 hour averages) were ≥ 135.4 ug/m3 for 14 days in Wenatchee during the 2012 wildfires which are defined as hazardous to health under the Washington Air Quality Index (WAQI). The WAQI provides health-based warning levels associated with different levels of $PM_{2.5}$ air concentrations (G. Palcisko, personal communication, October 14, 2015).
- A surveillance study by DOH, the Chelan-Douglas Health District and Kittitas County Public Health found a two-fold increase in the number of children's clinic and emergency department outpatient visits for asthma and respiratory and chest symptoms during 2012 wildfires in north central Washington compared to two weeks before the fires. A 60 percent increase in outpatient visits was also observed for chronic obstructive pulmonary diseases, excluding asthma, for all age groups for the same time period (DOH et al. 2015).
- All areas of Washington are currently in compliance with the U.S. EPA's ozone standards and Washington State has relatively low levels of ozone compared to other parts of the country.

Projections

- Ground level ozone concentrations are expected to increase in parts of the U.S. due to increases in summer temperatures, mainly in the Northeast, South, Midwest and Southwest (Patz et al. 2014; Garcia-Menendez et al. 2015).
- However, one study estimated that elevated local ozone concentrations could increase the number of cardiopulmonary deaths in King and Spokane counties by 63 and 37 people per year, respectively (Jackson et al. 2010).
- $PM_{2.5}$ air pollution is expected to increase with climate change due to increases in forest fires (see **Wildfires**).

- Climate change is also expected to lengthen the pollen producing season and increase pollen production (Rogers et al. 2006; Ziska and Caulfield 2000) which may result in prolonged and increased allergy and asthma symptoms (reviewed *in* Gamble et al. 2008).

Vulnerability

- Children, older adults and people with asthma and other lung and heart conditions are especially sensitive to impacts from $PM_{2.5}$ and ozone air pollution. Washington residents may be especially sensitive to these air pollutants due to higher rates of asthma in the state compared to the U.S. average (DOH 2014).

Wildfires

Background and public health impact

- Wildfires produce smoke that can be distributed over a large geographic area, potentially affecting many people. Smoke from wildfires contains fine particulates and gases including carbon monoxide (Lipsett et al. 2012). Fine particulates, also referred to as particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), can be carried deep into the lung when breathed.
- Exposure to wildfire smoke has been most strongly associated with respiratory health outcomes including respiratory symptoms, asthmatic symptoms, emergency room visits and hospital admissions for respiratory conditions (Liu et al. 2015). Wildfire smoke has also been associated with cardiovascular effects including hospital admissions for cardiovascular symptoms.

Observations

- From the mid-1980s onward, the incidence of large wildfires (>400 hectares) in western forests increased, as has the length of the wildfire season and the amount of area burned. Specifically, Westerling et al. (2006) compared 1970–1986 to 1986–2003 and found that average wildfire season length increased by 78 days and the acreage burned increased more than six and half times.
- These changes are accompanied by a shift toward unusually warm springs, longer summer dry seasons, and drier vegetation, all of which are due in part to reduced winter precipitation, early melting of spring snowpack (Westerling et al. 2006), and drought influences (Westerling et al. 2003).
- In 2015, 2.5 percent of Washington lands were burned by wildfires, compared to 1 percent, 0.4 percent and 0.8 percent in 2014, 2013, and 2012, respectively (DOH 2015).

Projections

- Due to increased summer temperature and decreased summer precipitation, the area burned by fire in the Pacific Northwest is expected to double by the 2040s and quadruple by the 2080s, relative to the 1916–2006 average (Littell et al. 2010).

Vulnerability

- Some studies have reported higher risks of cardiorespiratory health outcomes among older adults, children, and lower socioeconomic status populations associated with wildfire smoke exposures (Liu et al., 2015).

Sea Level Rise and Tidal Flooding

Background and public health impact

- Globally, sea level is rising in response to thermal expansion of water and melting of land-based ice (IPCC 2013).
- Local sea level is influenced by global sea level, and by two additional forces: (1) local changes in wind pushing water towards or away from the coast, and (2) tectonic forces that locally raise or lower the land itself (Mote et al. 2008). Washington State is affected by this final driver because the subduction of the Juan de Fuca plate under the North American plate is uplifting coastal land at a rate of 1-3 mm per year (Verdonck 2006).
- In spite of the mitigating effect of tectonic forces, some parts of Washington will still be affected by local sea level rise (Mote et al. 2008; see *Projections*).
- Local sea level rise would likely impact public health by contributing to coastal erosion and tidal flooding, in addition to relatively minor impacts on coastal drinking water supplies (Huppert et al. 2009).

Observations

- Worldwide sea level rose an average of 3 mm (⅛ inch) per year from 1993 to 2012 (IPCC 2013).
- A review of the literature did not reveal any evidence of recent, past sea level rise in Washington.

Projections

- Global sea level is projected to rise an additional 4.4–11.2 mm per year through the end of the 21st century (IPCC 2013).
- According to the Intergovernmental Panel on Climate Change (IPCC), it is very likely that global mean sea level rise will contribute to upward trends in extremely high coastal water levels that can lead to tidal flooding (IPCC 2012).
- Due to the additive effects of tectonic forces and global sea level rise, some parts of Washington will experience local sea level rise in the next 100 years whereas others may not.
- The Climate Impacts Group estimates the Olympic Coast will experience minimal sea level rise due to tectonic uplift, and the central and southern coast will experience between 1 and 18 inches by 2050. However, Puget Sound will experience between 3 and 22 inches of sea level rise by 2050, and 6 to 50 inches by 2100 (Mote et al. 2008).
- Note, however, the Mote et al. (2008) stresses that: (1) these calculations have not formally quantified the probabilities, (2) sea level rise cannot be estimated accurately at specific locations, and (3) these numbers are for advisory purposes and are not actual predictions.

Vulnerability

- Sea level rise is expected to increase flooding and erosion of beaches along Washington's coast. Homes and infrastructure near the coast will be threatened by changes in shorelines as a result of erosion. Several communities in southwest Washington and on Bainbridge Island have been identified as particularly susceptible to damage from beach erosion (Huppert et al., 2009).
- Many recognized tribal communities in Washington State have reservations near the coasts where sea level is expected to rise, and are at risk of being displaced from their land. Given that tribal cultural values are place-based, relocation due to environmental degradation is not an acceptable option (Grah and Beaulieu 2013). Sea level rise could also severely limit collection of important traditional food sources like shellfish (Lynn et al. 2013).

Heavy Precipitation and River Flooding

Background and public health impact

- Many studies have investigated the modelled impact of climate change upon weather extremes, including precipitation. There is strong agreement that the enhanced capacity of warm air to hold water vapor will increase the intensity of short-term precipitation (reviewed *in* Meehl et al. 2005).
- The potential public health impacts of heavy precipitation include river flooding and diminished water quality.
- Flooding damages housing and critical infrastructure like landfills and sewer systems. Flooding can contaminate drinking water supplies with bacteria, chemicals or saltwater and contributes to contamination of housing with chemicals or mold (these impacts reviewed *in* Alderman et al. 2012). However, there is still limited data about the health effects of floods in relation to morbidity (Ahern et al. 2005).

Observations

- Total yearly precipitation did not change for the 30°–50° latitude (including the United States) during the 20th century (Zhang et al. 2007).
- Many studies have demonstrated at least a modest increase in heavy precipitation events in Washington over the last 60–100 years (reviewed *in* Mass et al. 2011).

Projections

- Annual mean precipitation in the Pacific Northwest is projected to remain steady throughout the 21st century (Mote and Salathé 2010).
- However, it is expected that precipitation in the Pacific Northwest will become more seasonally variable and erratic in the future.
- Most models forecast a decline in summertime precipitation and an increase in winter precipitation in the Pacific Northwest (Mote and Salathé 2010). Regional climate models also predict an increase in the number of extreme high precipitation days in the next fifty years, particularly around the Puget Sound and Olympic coast (Salathé et al. 2010).
- The impact of climate change on river flood risk in Washington varies by basin. In snow-dominant watersheds, flood risk is likely to decrease due to reductions in snowpack (Hamlet and

Lettenmaier 2007). Mixed snow-rain watersheds flood risk depends upon a complex set of conditions and could either decrease or increase, but may experience heightened winter flooding (Mantua et al. 2010). Rain-dominant watersheds will likely experience little change (Hamlet and Lettenmaier 2007).

Vulnerability

- The largest increases in river flood frequency are predicted for catchments in Puget Sound, the west slopes of the Cascades in southwest Washington, and in the lower elevations on the east side of the Cascades. Modeling predicts increasing flood magnitudes in western Washington and decreasing or unchanged flooding magnitudes in eastern Washington (Mantua et al. 2010).

Drought and Snowpack

Background and public health impact

- Drought is a hydrologic condition where local water supply (for any use) is notably less than the historical average. In Washington State a drought emergency may be officially declared when the water supply for a geographical area is below seventy-five percent of normal, and the water shortage is likely to create undue hardships for various water uses and users (RCW 43.83B.400).
- Impacts to public health from drought include reduced availability of drinking water, failure of infrastructure due to low flows, and changes to water quality. Drought is also a contributing factor to increased wildfire activity (Westerling et al. 2003; Hessl et al. 2004).
- Drought can be caused by a variety of factors aside from net reduction in precipitation (rain/snow). Changes in the timing or type of precipitation can cause drought if it creates a condition where not enough water is available when it is needed. For instance, Washington State depends heavily upon melting snow (snowpack) to sustain water supplies during the drier summer months. Low accumulation snowpack over the winter can lead to drought in the summer.
- The capacity for snowpack to form is closely linked to air temperatures. Mountainous regions with winter air temperatures < -6°C (21.2°F) favor precipitation falling as snow, whereas regions averaging > 5°C (41°F) in midwinter tend to be dominated by rain (Hamlet and Lettenmaier 2007).

Observations

- Since 2000, Washington has declared three statewide drought emergencies (in 2001, 2005, and 2015). In 2006 the State declared a localized drought emergency in two watersheds on the Olympic Peninsula.
- Statewide drought emergencies are not common. However, in 6 of the last 15 years the water supply drought advisory committee has been convened to evaluate snowpack and water supply conditions because formation of the normal winter snowpack was late or low.
- Furthermore, from 1950 to 2000 snowpack in the Cascades was observed to decline by approximately 29 percent. This decline is largely attributable to rising air temperature (Mote 2003; Mote et al. 2005).

Projections

- Total snowpack is projected to decline an additional 38–46 percent by the 2040s, compared to the mean of the 1917–2006 water years. Low elevation snowpack is expected to be even more impacted: declines there will range between 49 percent and 58 percent by the 2040s, and will almost disappear by the 2080s (Elsner et al. 2010).
- Historically, the majority of basins that receive at least part of their precipitation as snow were centered along the Cascade Mountains and northern Washington. It is anticipated that by the 2080s none of these watersheds will be dominated by snow, and that the mixed snow/rain watersheds of the central/southern Cascades and northeastern Washington will have completely lost their snowpack (Mantua et al. 2010).
- These changes in the way water is stored could lead to increased incidence of drought in the future if resource managers fail to adjust their management strategies.

Vulnerability

- Agricultural interests are vulnerable to drought. The farmers most vulnerable to the impacts of drought are dryland farmers in the south central and east regions, berry farmers in the southwest/Olympic Peninsula region, and farmers with junior water rights in the south central region (Fontaine and Steinemann 2009).
- As with sea level rise (see **Sea Level Rise and Tidal Flooding**), some tribal communities are at risk of losing access to traditionally important food sources (i.e., salmon, lamprey) due to loss of snowpack and resulting streamflow (Dittmer 2013; Grah and Beaulieu 2013).

Vector-Borne and Zoonotic Diseases

Background and public health impact

- Several vector-borne and zoonotic diseases (VBZD) are present in Washington and human cases occur each year, although at lower numbers than are seen in much of the United States. The following are three high profile diseases that exist in Washington.
- **West Nile virus** (WNV) is a virus transmitted by mosquitos that first appeared in the United States in 1999 (Soverow et al. 2009). The virus first appeared in Washington in 2002, and in 2009 the state had the highest number of human infections (36 cases from in-state exposure) to date. In 2015 there were 22 human cases, and 14 percent of mosquito pools that were tested were found positive for the virus.
- Approximately 80 percent of people infected with WNV are asymptomatic, while around 20 percent develop WNV fever (fever, headache, rash) and less than 1 percent develops WNV neuroinvasive disease (meningitis, encephalitis, paralysis).
- **Sin Nombre virus** is a highly pathogenic Hantavirus that infects North American deer mice (*Peromyscus maniculatus*) and can cause Hantavirus Pulmonary Syndrome (HPS) in humans (Mills et al. 2010a). Each year there are 1 to 5 cases reported, with most exposures occurring in eastern Washington. About 30 percent of cases are fatal.
- **Lyme disease** is caused by a bacterium (*Borrelia burgdorferi*) which is transmitted in Washington by the western black-legged tick, *Ixodes pacificus* (Stanek et al. 2012). Each year there are 1–3 cases of Lyme disease from in-state tick exposure. Most of these cases come from exposure on

the west side of the Cascade Mountains, which reflects the primary distribution of the Ixodes tick vectors.

- Along with flu-like symptoms and the classic bull's-eye rash, joint, nervous, and heart complications can also occur. Tick surveillance and testing since 2010 has shown that approximately 2 percent of black-legged ticks in Washington are infected with *B. burgdorferi*.

Observations

- VBZDs are influenced by climate through climate's direct effects on the pathogen, vector, and host and their interactions with one another. Environmental factors, such as temperature, relative humidity, and precipitation, also directly influence vector-borne and zoonotic disease cycles (Tabachnick 2010).
- Western black-legged ticks are found primarily in western Washington with adult population activity most prevalent from February through early summer.
- West Nile virus has become endemic in south central Washington. The virus has been detected in 0.3 percent to 25 percent of tested mosquito samples every year since 2008.
- Surveillance by DOH in the early 1990s demonstrated that Hantavirus was present in deer mouse populations across Washington.

Projections

- There is much that remains unknown about how climate change will impact VBZDs in Washington. However, any changes in VBZDs as a result of influence by climate change will likely be due to one (or a combination) of four primary mechanisms (Mills et al. 2010b):
    - Range shifts in host or vector distribution that brings these organisms into contact with new human populations (Moritz et al. 2008).
    - Changes in the population density of the host or vector that would change frequency of contact with humans.
    - Changes in the prevalence of infection in the host or vector population that would change the frequency of human contact with an infected host or vector.
    - Changes in pathogen load in hosts or vectors that would affect the likelihood that human contact would result in pathogen transmission. Pathogen loading could be brought about by changes in rates of pathogen reproduction, replication, or development.

Vulnerability

- All populations are at risk of vector-borne and zoonotic diseases, in one form or another.
- Those who work or recreate outside in parks or other undeveloped areas are at a greater risk for tick-borne diseases.
- Those who spend time outside in the late afternoon and evening during mosquito season are at the greatest risk for exposure to West Nile virus, particularly in south central Washington.

Harmful Algal Blooms

Background and public health impact

- Harmful algal blooms (HABs) are blooms of naturally occurring marine or freshwater algae that can produce potent toxins with harmful physiological effects (including illness or death) in wildlife and humans. People can be exposed to these toxins either through inhalation, ingestion of contaminated shellfish or fish or through direct skin contact, depending on the situation and species of algae. People can be exposed to freshwater biotoxins through drinking water and incidental ingestion of water during recreational activities.
- Bloom formation is favored by conditions of adequate light availability, warm water, stratification, and high nutrient levels. Marine HABs typically bloom in Washington during the summer or in shoulder seasons when water temperatures are warmer than usual. Freshwater HABs can occur throughout the year but are highest in late summer and fall in state lakes.

Observations

- Researchers have noted an apparent increase in the global frequency, duration and geographic scope of harmful algal blooms in the last several decades of the 20th century (Hallegraeff 1993; Van Dolah 2000; Glibert et al. 2005).
- This increase has been attributed to various causes, including anthropogenic nutrient enrichment, ballast water discharge, and climate change (reviewed *in* Moore et al. 2011).
- The linkages between these factors and algal abundance, distribution, and bloom characteristics are complicated, and uncertainty currently hampers our ability to determine the exact cause of observed changes. Therefore, we present the following observations as suggestive of changes in the ecosystem without necessarily limiting the causal explanation to climate change exclusively:
    - Trainer et al. (2003) noted that since the 1980s the dinoflagellate responsible for paralytic shellfish poisoning (PST; *Alexandrium catenella*) has slowly expanded its range from northern Puget Sound to the south. PSTs are now regularly found in all basins except Hood Canal (Moore et al. 2011).
    - Preliminary data analysis indicates that marine HAB closures in Puget Sound now occur earlier in the year than what was typical in the past (J. Borchert, personal communication, October 20, 2015).
    - Limited information on Puget Sound lowland lakes suggest that years with higher temperatures result in higher concentrations of microcystins and a greater number of lakes with toxins above state recreational guidance values (Hardy et al. 2015).
    - Warm water temperatures in lakes that drain into Puget Sound have been associated with the discharge of freshwater toxic blooms that bioaccumulate in marine shellfish (Preece et al. 2015a, Preece et al. 2015b).

Projections

- Based on analysis of past events, Moore et al. (2009) identified a suite of weather and environmental conditions that precede the development of toxic events due to *A. catenella* in Puget Sound. These conditions are warm air and water temperatures, weak winds, low stream flow, and small tidal height variability.

- Applying this model to future estimates of climate variability indicates that the environmental conditions that favor toxic *A. catenella* blooms may increase by nearly two weeks per year by the end of the 21st century. Furthermore, blooms are predicted to begin earlier in the year and persist for longer (Moore et al. 2011).
- Extreme rainfall events (Anderson et al. 2012) and ocean acidification combined with nutrient limitation or temperature changes (Fu et al. 2012) also are hypothesized to have future impacts upon bloom development and toxicity levels, respectively.

Vulnerability

- People who eat raw or cooked shellfish are most at risk for exposure to marine harmful algal blooms.
- People and animals that drink water from lakes with toxic blooms or ingest water during recreational activities are most at risk from freshwater HABs.

Vibrio

Background and public health impact

- *Vibrio parahaemolyticus* is a bacterium indigenous to marine and estuarine waters around the world. *Vibrio parahaemolyticus* is a common causative agent of food-borne gastroenteritis (food poisoning) and can present a serious health burden, especially to regions with high levels of raw or undercooked seafood consumption.
- *Vibrio vulnificus* is a related bacterium that typically causes more severe systemic illnesses, including necrotizing wound infections and septicemia. *Vibrio vulnificus* does not tolerate low temperatures or high salinity well (Kelly 1982) and has not been common in Washington.
- Temperature is the primary environmental predictor of vibrio abundance and distribution, and these organisms multiply rapidly when exposed to either warm water or warm ambient air temperatures (Johnson et al. 2012).
- In Washington, vibrio control is of special concern to the oyster industry. *Vibrio parahaemolyticus* can increase by four to eight times in oysters during intertidal exposure (Nordstrom et al. 2004) and by 50 to almost 800 times within 24 hours of oyster harvest, if exposed to a ≥ 26°C (82.4°F) environment (Gooch et al. 2002).

Observations

- Anomalies in sea surface temperature, such as those associated with the El-Niño Southern Oscillation (ENSO), have occurred concurrent with vibrio outbreaks in Chile (González-Escalona et al. 2005), Peru (Martinez-Urtaza et al. 2008), Alaska (McLaughlin et al. 2005), and the Pacific Northwest (CDC 1998).
- Martinez-Urtaza et al. (2010) reviewed these cases and concluded that sea surface temperature intrusion can temporarily extend the geographic range and elevate the abundance of *both V. parahaemolyticus* and *V. vulnificus*.
- There is no definitive evidence of either an increase or decrease over time in vibrio abundance or illnesses due to vibrio (vibriosis) in Washington State.

- *Vibrio vulnificus* is currently present at very low, but detectable levels in Washington (Johnson et al. 2012). While this bacterium has not yet caused any confirmed illnesses or deaths in Washington, *V. vulnificus* is considered a potential emerging threat.

Projections

- Elevated air and sea surface temperatures are both anticipated outcomes of climate change (IPCC 2013). Therefore, the observation that vibrios respond positively to warm ENSO conditions is suggestive of future vibrio range expansions and an increase in total abundance.
- However, a review of the literature found no formal projections of vibrio range or abundance, or future illnesses based upon climate change.

Vulnerability

- Residents of the Pacific Northwest are vulnerable to *Vibrio parahaemolyticus*-associated gastroenteritis because of the prevalence of raw oyster consumption in this region. The Pacific Northwest is currently at lower risk of exposure to *V. vulnificus* than other parts of the United States (e.g., the Gulf Coast states) because this bacterium prefers water > 20°C (68°F) (Kelly 1982).
- Immunocompromised individuals, especially those with impaired liver function, appear to be at the greatest risk of severe infection leading to septicemia by either *V. parahaemolyticus* or *V. vulnificus* (Hlady and Klontz 1996).

References

Ahern, M., Kovats, R. S., Wilkinson, P., Few, R., & Matthies, F. (2005). Global health impacts of floods: epidemiologic evidence. *Epidemiologic Reviews*, *27*(1), 36-46.

Alderman, K., Turner, L. R., & Tong, S. (2012). Floods and human health: a systematic review. *Environment International*, *47*, 37-47.

Anderson, D. M., Cembella, A. D., & Hallegraeff, G. M. (2012). Progress in understanding harmful algal blooms: paradigm shifts and new technologies for research, monitoring, and management. *Annual Review of Marine Science*, *4*, 143-176.

Bumbaco, K. A., Dello, K. D., & Bond, N. A. (2013). History of Pacific Northwest heat waves: Synoptic pattern and trends. *Journal of Applied Meteorology and Climatology*, *52*(7), 1618-1631.

CDC; Centers for Disease Control and Prevention. (1998). Outbreak of *Vibrio parahaemolyticus* infections associated with eating raw oysters -- Pacific Northwest, 1997. *Morbidity and Mortality Weekly Reports*, *47*(22), 457–462.

Dittmer, K. (2013). Changing streamflow on Columbia basin tribal lands—climate change and salmon. *Climatic Change*, *120*(3), 627-641.

DOH, Washington State Department of Health. (2014). Asthma Washington State 2014 fact sheet. Available at: http://www.doh.wa.gov/Portals/1/Documents/Pubs/345-304-AsthmaInWashingtonState.pdf

DOH, Washington State Department of Health. (2015). Wildfires: Percent of Washington State burned. Available at: http://www.doh.wa.gov/WTN.

DOH, Washington State Department of Health, Chelan-Douglas Health District, & Kittitas County Public Health. (2015). Surveillance investigation of the cardiopulmonary health effects of the 2012 wildfires in north central Washington State. Unpublished manuscript.

Donat, M. G., & Alexander, L. V. (2012). The shifting probability distribution of global daytime and night-time temperatures. *Geophysical Research Letters*, *39*(14).

Elsner, M. M., Cuo, L., Voisin, N., Deems, J. S., Hamlet, A. F., Vano, J. A., Mickelson, K. E. B., Lee, S-Y., & Lettenmaier, D. P. (2010). Implications of 21st century climate change for the hydrology of Washington State. *Climatic Change*, *102*(1-2), 225-260.

Fontaine, M. M., & Steinemann, A. C. (2009). Assessing vulnerability to natural hazards: Impact-based method and application to drought in Washington State. *Natural Hazards Review*, 10(1): 11-18.

Fu, F. X., Tatters, A. O., & Hutchins, D. A. (2012). Global change and the future of harmful algal blooms in the ocean. *Marine Ecology Progress Series*, *470*, 207-233.

Gamble, J. L., Reid, C. E., Post, E., & Sacks, J. (2008). Review of the impacts of climate variability and change on aeroallergens and their associated effects. US Environmental Protection Agency: Washington, DC, USA, 91 pp. EPA/600/R-06/164F.

Garcia-Menendez, F., Saari, R. K., Monier, E., & Selin, N. E. (2015). US air quality and health benefits from avoided climate change under greenhouse gas mitigation. *Environmental Science & Technology*, *49*(13), 7580-7588.

Gershunov, A., Cayan, D. R., & Iacobellis, S. F. (2009). The great 2006 heat wave over California and Nevada: signal of an increasing trend. *Journal of Climate*, *22*(23), 6181-6203.

Glibert, P. M., Anderson, D. M., Gentien, P., Graneli, E., & Sellner, K. G. (2005). The global, complex phenomena of harmful algal blooms. *Oceanography, 18*, 136–147.

González-Escalona, N., Cachicas, V., Acevedo, C., Rioseco, M. L., Vergara, J. A., Cabello, F., Romero, J., & Espejo, R. T. (2005). *Vibrio parahaemolyticus* diarrhea, Chile, 1998 and 2004. *Emerging Infectious Diseases*, *11*(1), 129.

Gooch, J. A., DePaola, A., Bowers, J., & Marshall, D. L. (2002). Growth and survival of *Vibrio parahaemolyticus* in postharvest American oysters. *Journal of Food Protection*, *65*(6), 970-974.

Grah, O., & Beaulieu, J. (2013). The effect of climate change on glacier ablation and baseflow support in the Nooksack River basin and implications on Pacific salmonid species protection and recovery. *Climatic Change*, *120(3)*, 657–670.

Hallegraeff, G. M. (1993). A review of harmful algal blooms and their apparent global increase. *Phycologia*, *32*(2), 79-99.

Hamlet, A. F., & Lettenmaier, D. P. (2007). Effects of 20th century warming and climate variability on flood risk in the western US. *Water Resources Research*, *43*(6).

Hardy, F. J., LeDoux, B., Abella, S., Bouchard, D., Burgdorf, M., Gibbons, M., Hamel, K., Hannach, G., Hanowell, R., Jacoby, J., Read, L. B., Seebacher, L. Tuttle, L., & Williams., G. (2015). Public health implications of a three-year cyanotoxin survey of Puget Sound lowland lakes. Unpublished manuscript, in prep.

Hessl, A. E., McKenzie, D., & Schellhaas, R. (2004). Drought and Pacific Decadal Oscillation linked to fire occurrence in the inland Pacific Northwest. *Ecological Applications*, *14*(2), 425-442.

Hlady, W. G., & Klontz, K. C. (1996). The epidemiology of Vibrio infections in Florida, 1981–1993. *Journal of Infectious Diseases*, *173*(5), 1176-1183.

Huppert, D. D., Moore, A., & Dyson, K. (2009). Impacts of climate change on the coasts of Washington State. *Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate*, 285-309.

IPCC. (2012). Managing the risks of extreme events and disasters to advance climate change adaptation: Special Report of the Intergovernmental Panel on Climate Change [Barros, V., Stocker, T. F., Qin, D., Dokken, D.J., Ebi, K. L., Mastrandrea, M. D., Mach, K. J., Plattner, G.-K., Allen, S. K., Tignor, M, & Midgley, P. M. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 582 pp.

IPCC. (2013). Climate change 2013: The physical science basis. Contribution of working group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T. F., Qin, D., Plattner, G.-K., Tignor, M., Allen, S. K., Boschung, J., Nauels, A., Xia, Y., Bex V., & Midgley, P. M. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

Jackson, J. E., Yost, M. G., Karr, C., Fitzpatrick, C., Lamb, B. K., Chung, S. H., Chen, J., Avise, J., Rosenblatt, R. A., & Fenske, R. A. (2010). Public health impacts of climate change in Washington State: projected mortality risks due to heat events and air pollution. *Climatic Change*, *102*(1-2), 159-186.

Johnson, C. N., Bowers, J. C., Griffitt, K. J., Molina, V., Clostio, R. W., Pei, S., Laws, E., Paranjpye, R. N., Strom, M. S., Chen, A., Hasan, N. A., Huq, A., Noriea III, N. F., Grimes, J., & Colwell, R. R. (2012). Ecology of *Vibrio parahaemolyticus* and *Vibrio vulnificus* in the coastal and estuarine waters of Louisiana, Maryland, Mississippi, and Washington (United States). *Applied and Environmental Microbiology*, *78*(20), 7249-7257.

Kalkstein, L. S., & Davis, R. E. (1989). Weather and human mortality: an evaluation of demographic and interregional responses in the United States. *Annals of the Association of American Geographers*, *79*(1), 44-64.

Kelly, M. T. (1982). Effect of temperature and salinity on *Vibrio (Beneckea) vulnificus* occurrence in a Gulf Coast environment. *Applied and Environmental Microbiology*, *44*(4), 820-824.

Lipsett, M., Materna, B., Stone, S.L., Therriault, S., Blaisdell, R. & Cook, J. (2012). Wildfire smoke: A guide for public health officials. California Office of Environmental Health Hazard Assessment.

Littell, J. S., Oneil, E. E., McKenzie, D., Hicke, J. A., Lutz, J. A., Norheim, R. A., & Elsner, M. M. (2010). Forest ecosystems, disturbance, and climatic change in Washington State, USA. *Climatic Change*, *102*(1-2), 129-158.

Liu, J. C., Pereira, G., Uhl, S. A., Bravo, M. A., & Bell, M. L. (2015). A systematic review of the physical health impacts from non-occupational exposure to wildfire smoke. *Environmental Research*, *136*, 120-132.

Luber, G., Knowlton, K., Balbus, J., Frumkin, H., Hayden, M., Hess, J., McGeehin, M., Sheats, N., Backer, L., Beard, C. B., Ebi, K. L., Maibach, E., Ostfeld, R. S., Wiedinmyer, C., Zielinski-Gutiérrez, E., & Ziska, L., (2014). Chapter 9: Human Health. *Climate Change Impacts in the United States: The Third National Climate Assessment*. [Melillo, J. M., Richmond, T. C., & Yohe, G. W. (eds.)]. U.S. Global Change Research Program, 220-256.

Lynn, K., Daigle, J., Hoffman, J., Lake, F., Michelle, N., Ranco, D., Viles, C., Voggesser, G., & Williams, P. (2013). The impacts of climate change on tribal traditional foods. *Climatic Change*, *120*(3), 545-556.

Mantua, N., Tohver, I., & Hamlet, A. (2010). Climate change impacts on streamflow extremes and summertime stream temperature and their possible consequences for freshwater salmon habitat in Washington State. *Climatic Change*, 102(1-2), 187-223.

Martinez-Urtaza, J., Bowers, J. C., Trinanes, J., & DePaola, A. (2010). Climate anomalies and the increasing risk of *Vibrio parahaemolyticus* and *Vibrio vulnificus* illnesses. *Food Research International*, *43*(7), 1780-1790.

Martinez-Urtaza, J., Huapaya, B., Gavilan, R. G., Blanco-Abad, V., Ansede-Bermejo, J., Cadarso-Suarez, C., Figueiras, A., & Trinanes, J. (2008). Emergence of asiatic Vibrio diseases in South America in phase with El Niño. *Epidemiology*, *19*(6), 829-837.

Mass, C., Skalenakis, A., & Warner, M. (2011). Extreme precipitation over the west coast of North America: Is there a trend? *Journal of Hydrometeorology*, *12*(2), 310-318.

McGeehin, M. A., & Mirabelli, M. (2001). The potential impacts of climate variability and change on temperature-related morbidity and mortality in the United States. *Environmental Health Perspectives*, *109*(Suppl 2), 185.

McLaughlin, J. B., DePaola, A., Bopp, C. A., Martinek, K. A., Napolilli, N. P., Allison, C. G., Murray, S. L., Thompson, E. C., Bird, M. M., & Middaugh, J. P. (2005). Outbreak of *Vibrio parahaemolyticus* gastroenteritis associated with Alaskan oysters. *New England Journal of Medicine*, *353*(14), 1463-1470.

Meehl, G. A., Arblaster, J. M., & Tebaldi, C. (2005). Understanding future patterns of increased precipitation intensity in climate model simulations. *Geophysical Research Letters*, *32*(18).

Mills, J. N., Amman, B. R., & Glass, G. E. (2010a). Ecology of hantaviruses and their hosts in North America. *Vector-Borne and Zoonotic Diseases*, *10*(6), 563-574.

Mills, J. N., Gage, K. L., & Khan, A. S. (2010b). Potential influence of climate change on vector-borne and zoonotic diseases: a review and proposed research plan. *Environmental Health Perspectives*, *118*(1), 1507-1514.

Moore, S. K., Mantua, N. J., Hickey, B. M., & Trainer, V. L. (2009). Recent trends in paralytic shellfish toxins in Puget Sound, relationships to climate, and capacity for prediction of toxic events. *Harmful Algae*, *8*(3), 463-477.

Moore, S. K., Mantua, N. J., & Salathé, E. P. (2011). Past trends and future scenarios for environmental conditions favoring the accumulation of paralytic shellfish toxins in Puget Sound shellfish. *Harmful Algae*, *10*(5), 521-529.

Moritz, C., Patton, J. L., Conroy, C. J., Parra, J. L., White, G. C., & Beissinger, S. R. (2008). Impact of a century of climate change on small-mammal communities in Yosemite National Park, USA. *Science*, *322*(5899), 261-264.

Mote, P. W. (2003). Trends in snow water equivalent in the Pacific Northwest and their climatic causes. *Geophysical Research Letters*, *30*(12).

Mote, P. W., Hamlet, A. F., Clark, M. P., & Lettenmaier, D. P. (2005). Declining mountain snowpack in western North America. *Bulletin of the American Meteorological Society*, *86*(1), 39-49.

Mote, P., Petersen, A., Reeder, S., Shipman, H., & Binder, L. W. (2008). Sea level rise in the coastal waters of Washington State. A report by The University of Washington Climate Impacts Group and the Washington Department of Ecology, 11 pp.

Mote, P. W., & Salathé Jr, E. P. (2010). Future climate in the Pacific Northwest. *Climatic Change*, *102*(1-2), 29-50.

Nordstrom, J. L., Kaysner, C. A., Blackstone, G. M., Vickery, M. C. L., Bowers, J. C., & DePaola, A. (2004). Effect of intertidal exposure on *Vibrio parahaemolyticus* levels in Pacific Northwest oysters. *Journal of Food Protection*, *67*(10), 2178-2182.

Patz, J. A., Frumkin, H., Holloway, T., Vimont, D. J., & Haines, A. (2014). Climate change: challenges and opportunities for global health. *Journal of the American Medical Association*, *312*(15), 1565-1580.

Preece, E. P., Moore, B. C., & Hardy, F. J. (2015a). Transfer of microcystin from freshwater lakes to Puget Sound, WA and toxin accumulation in marine mussels (*Mytilus trossulus*). *Ecotoxicology and Environmental Safety*, *122*, 98-105.

Preece, E. P., Moore, B. C., Hardy, F. J., & Deobald, L. A. (2015b). First detection of microcystin in Puget Sound, Washington, mussels (*Mytilus trossulus*). *Lake and Reservoir Management*, *31*(1), 50-54.

Rogers, C. A., Wayne, P. M., Macklin, E. A., Muilenberg, M. L., Wagner, C. J., Epstein, P. R., & Bazzaz, F. A. (2006). Interaction of the onset of spring and elevated atmospheric CO_2 on ragweed (*Ambrosia artemisiifolia L.*) pollen production. *Environmental Health Perspectives*, 865-869.

Salathé Jr, E. P., Leung, L. R., Qian, Y., & Zhang, Y. (2010). Regional climate model projections for the State of Washington. *Climatic Change*, *102*(1-2), 51-75.

Soverow, J., Wellenius, G., Fisman, D., & Mittleman, M. (2009). Infectious disease in a warming world: how weather influenced West Nile virus in the United States (2001–2005). *Environmental Health Perspectives* 117(7), 1049–1052.

Stanek, G., Wormser, G. P., Gray, J., & Strle, F. (2012). Lyme borreliosis. *The Lancet*, *379*(9814), 461-473.

Tabachnick, W. J. (2010). Challenges in predicting climate and environmental effects on vector-borne disease episystems in a changing world. *The Journal of Experimental Biology*, *213*(6), 946–954.

Trainer, V. L., Eberhart, B. T. L., Wekell, J. C., Adams, N. G., Hanson, L., Cox, F., & Dowell, J. (2003). Paralytic shellfish toxins in Puget Sound, Washington State. *Journal of Shellfish Research*, *22*(1), 213-223.

Van Dolah, F. M. (2000). Marine algal toxins: origins, health effects, and their increased occurrence. *Environmental Health Perspectives*, *108*(Suppl 1), 133.

Verdonck, D. (2006). Contemporary vertical crustal deformation in Cascadia. *Tectonophysics*, *417*(3), 221-230.

Westerling, A. L., Gershunov, A., Brown, T. J., Cayan, D. R., & Dettinger, M. D. (2003). Climate and wildfire in the western United States. *Bulletin of the American Meteorological Society*, *84*(5), 595-604.

Westerling, A. L., Hidalgo, H. G., Cayan, D. R., & Swetnam, T. W. (2006). Warming and earlier spring increase western US forest wildfire activity. *Science*, *313*(5789), 940-943.

Zhang, X., Zwiers, F. W., Hegerl, G. C., Lambert, F. H., Gillett, N. P., Solomon, S., Stott, P. A., & Nozawa, T. (2007). Detection of human influence on twentieth-century precipitation trends. *Nature*, *448*(7152), 461-465.

Ziska, L. H., & Caulfield, F. A. (2000). Rising CO_2 and pollen production of common ragweed (*Ambrosia artemisiifolia L.),* a known allergy-inducing species: implications for public health. *Functional Plant Biology*, *27*(10), 893-898.

WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark - Commissioner of Public Lands

Caring for
your natural resources
... now and forever

June 13, 2016

Millennium Bulk Terminals EIS
c/o ICF International
710 Second Ave, Suite 550
Seattle, WA 98104

Subject: Comments on the Millennium Bulk Terminals draft EIS

Dear Co-Lead Agencies:

Please accept these comments from the Washington State Department of Natural Resources (DNR) regarding the draft Environmental Impact Statement (DEIS) for the proposed Millennium Bulk Terminals coal export terminal at Longview, Washington. DNR is the manager of over 3 million acres of state trust lands comprised of forest, range, commercial, and agricultural lands, and 2.6 million acres of state-owned aquatic lands. In addition, DNR administers the state Forest Practices Rules on more than 12.7 million acres of non-federal, public, and private lands.

DNR is committed to sustainably managing the state's resources, relying on sound science, and making transparent decisions in the public's interest and with the public's knowledge throughout the environmental review process. I have directed my staff to provide technical support to the co-lead agencies towards ensuring a robust, science-based, and comprehensive environmental review process.

DNR is regarded as possessing special expertise under Washington state's environmental policy act rules, Chapter 197-11-920, Washington Administrative Code (WAC) related to the following areas: water resources and water quality of state-owned aquatic tidelands, shorelands, harbor areas, beds of navigable waters; natural resources development; energy production, transmission, and consumption (geothermal, coal, and uranium); land use and management of state-owned or managed lands; recreation; and burning in forests. DNR is also an agency with jurisdiction for this project under Chapter 197-11-714(3), WAC.

The proposed project includes two new docks supporting two new ship loaders, an access trestle, and dredging of a new berthing area. Each of these project components would occur on state-owned aquatic lands that are currently leased for an existing dock and related facilities, and would require DNR's approval. Additional authorization from DNR is also necessary for dredging outside the lease area and geotechnical studies or other pre-construction activities requiring entry onto state-owned aquatic lands. These authorizations make DNR an agency with jurisdiction under the State Environmental Policy Act, Ch. 43.21C RCW (SEPA) rules. DNR will consider whether to approve the proposed terminal on state-owned aquatic lands after DNR completes a thorough review of the potential project impacts documented through the

environmental review, permitting, and public comment processes and any additional information pertinent to its review under the lease.

DNR appreciates the opportunity to submit comments on the DEIS which are provided in the attachment to this letter. The attachment identifies where DNR has identified probable significant adverse impacts needing further analysis and identification of potential mitigation measures, or impacts that have not been addressed in the DEIS. DNR would appreciate being treated as a consulted agency as defined in WAC 197-11-724 throughout the SEPA process.

Should you have any questions regarding this letter, please do not hesitate to contact me at 360-902-1034.

Sincerely,

Megan Duffy
Deputy Supervisor for Aquatics & Geology

IMPACTS TO STATE-MANAGED LANDS IN THE IMMEDIATE PROJECT VICINITY

Chapter 4 Natural Environment
Geology and soils, Page 4.1-15

Seismic: The DEIS understates the likelihood of a subduction earthquake event. The average recurrence interval of a magnitude 8 to 9 earthquake on the Cascadia subduction zone is estimated at 240 years, and the last major earthquake occurred in 1700. A recent study estimates a 37% probability (i.e., greater than 1 in 3) that a magnitude 8 to 9 or greater earthquake will occur somewhere along the Cascadia fault in the next 50 years.[1] This affects operations, as it would result in direct impacts related to ground shaking, landslides, and liquefaction, and should be analyzed in the Operations-Direct Impacts section of the FEIS.

- Please provide mitigation measures to ensure that the facility, including coal storage and handling processes and structures (including loading and offloading), are resilient under a magnitude 8 to 9 earthquake along the Cascadia fault.
- Please provide mitigation measures to address coal train derailments and resulting coal spills both in the Project Area and along the rail routes in the event of a magnitude 8 to 9 earthquake along the Cascadia fault.

Levees: The DEIS describes levees built in the 1920s at a height of 36 feet above sea level. Please define the height of the lowest point on the levee above highest high tide. What is the likelihood of this point being overtopped at the end of the facility's expected life when considering projected sea level rise, high highest tide, storm surge, erosion, and seismic uplift or subsidence?

Also, the DEIS does not define whether these levees are certified by FEMA to withstand a 1% annual chance of flood. Please state whether the levees are - or are not - FEMA certified. If not, the levees should not be considered as protective against inundation. The project area is currently in Zone X, which may be inundated by up to 1 foot of water in a 100 year flood. How will this change by the end of the facility's life when considering projected sea level rise, highest high tide, storm surge, erosion, and seismic uplift or subsidence?

- If the levees are not currently certified by FEMA to withstand a 1% annual chance of historic flood, please provide appropriate mitigation measures.
- If, given climate change impacts, the risk of levee overtopping at the end of the facility's life is greater than 1% annual chance, please provide appropriate mitigation measures.

[1] Goldfinger, C. et al. 2012. Turbidite Event History: Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone. USGS Prof. Pap. 1661-F. USGS, Reston, Virginia.

Water Quality; Section 4.5, Page 20
This section provides minimal description of initial and periodic maintenance dredging impacts and should provide more specifics on the impacts to water quality at the site. The FEIS should also address the rate at which contaminants from upriver may deposit in the dredged area and whether this is a concern for biota that occupy this area.

Water Quality; Section 5.7 4
Table 5.7-2 identifies the storage and loading of coal onto vessels as having potential to generate coal dust emissions. The document states that the stockpile area and vessel-loading conveyors would not be enclosed due to operational requirements. The ecological impacts of coal dust is discussed on page 5.7-14 of the document; however, the analysis focuses on bioavailability of the chemical constituents based on U.S. EPA standards. The potential impacts of these sources on the aquatic lands below and adjacent to the dock were not analyzed. The analysis does not address the potential impacts of potential smothering or shading of benthic habitats associated with coal dust deposition into surface waters adjacent to the dock. Page 5.7-17 concludes that monthly coal deposition in the project area would be .31 gm/m2/month. What is the basis of this conclusion, given that at the BC Canadian Roberts Bank coal terminal, coal was shown to compose 10-12% of the sediments in the vicinity of the terminal after 22 years causing anoxic conditions beneath the coating of oxidized coal? How could spills associated with loading of vessels result in potential for additional deposition? How will the buildup of coal onto benthic habitats and state-owned aquatic lands over time be prevented? What measures are in place to prevent the loading spout from overfilling or opening when operating above the deck of the vessel, or in the case of a vessel collision with the dock or other vessel? What procedures will be taken to clean up any spills before they cause damage?

Waves and Prop Scour, Section 4.5
Section 4.5, Pages 26 and 28 identify limited impacts in the turning basin due to use of tugs to maneuver ships into place in correlation to depth of dredged area of 20' to 40'+ depth in this area. The FEIS should provide further details on whether prop scour could impact bank stability of dredged slopes. Will this impact shoreline stability and vegetation? The conclusion in Section 4.5 of the DEIS that vessels calling at Docks 2 and 3 would have sufficient depth to minimize the potential for prop-wash should also be revisited given that the proposed facility will have a depth of 43 feet and 80% of the vessels calling at the facility will be Panamax vessels, apparently with drafts of at least 42 feet (DEIS 2-16 n. 13; Table 4.5-13). The EIS should address dredging, turbidity and scour assuming the largest vessels expected to call at the facility during all river conditions.

Wildlife, Page 4.8-10
The DEIS is inadequate in its description of aquatic species occurring within the proposed project impact area, what are referred as "common species of invertebrates and amphibians" and "Freshwater insects and other invertebrate species (i.e., mollusks, crayfish)". Freshwater mussels in the area include *Anodonta nuttalliana*, *Anodonta californiensis, Anodonta oregonensis.* All occur in the lower reaches of the Columbia and are important species in the ecosystem providing food for fish, mammals and water birds. They are filter feeders and therefore sensitive to levels of turbidity and oxygen. The mussels all require host fish as part of the reproduction cycle so

direct impacts to fin fish from this project indirectly impact these mussels (Nedeau et al, 2004) and should be considered in the EIS.

Dredge Impacts, Section 5.7
It is becoming increasingly clear that carbon is not only stored in terrestrial systems but can also be stored in marine and aquatic sediments and associated marine and aquatic ecosystems. The draft EIS considers the impact of "Vegetation and soil removal" in its estimate of greenhouse emissions from construction, operation, and transportation in Cowlitz County in section 5.8.1.5. The EIS should also consider the potential greenhouse emissions that could arise from the proposed removal of 500,000 cubic yards of sediment and proposed annual dredging.

Surface water and floodplains, Page 4.2-15
The EIS should assess the potential for construction of the project to "redirect sheetflow and potentially lead to localized flooding on or off site" to increase sediment loads and changes in downstream channel sinuosity as both direct and INDIRECT impacts.

Water storage and treatment within the coal storage area discussed on page 15 needs to develop a treatment option for large storm events that eliminates potential discharge of contaminants for existing outfall 002A in to the Columbia River.

Water Quality, Page 4.5-22
The EIS should assess and mitigate for the INDIRECT impacts including continued leaching of creosote associated with the timber pile dikes remaining in the sediment from cut pilings.

Vegetation, Page 4.6-8
Submerged plants are mentioned briefly under a section titled **Open Water** and Columbia water meal is listed as a special status plant species. However, there is no acknowledgement of the important ecological functions that freshwater plants and macrophytes provide for fish and invertebrates using this habitat (Beland et al, 2004).

Vegetation, Page 4.6, Page 5-23
The DEIS does not discuss potential direct or indirect impacts from construction and operations to vegetation from shade. Shading from overwater structures and moored vessels will eliminate suitable habitat for submerged and emergent vegetation in the nearshore. Macrophytes grown on plants provide many of the same benefits to trout and salmon that seagrasses and algae provide in estuaries. Permanent removal of this habitat will impact fish, invertebrates, birds and mammals that feed and find refuge there (Rondorf et al, 2010).

- Under MM VEG-2. Conduct Aquatic Vegetation Surveys Prior to Construction. (p. 4.6-26) DNR recommends that Department of Ecology's "Aquatic Plant Sampling Protocols" (2001) be used for pre-construction aquatic vegetation surveys (found at: https://fortress.wa.gov/ecy/publications/summarypages/0103017.html)
- Under MM VEG-3 and VEG-4. (p. 4.6-26) Additional authorization from DNR would be required for revegetation activities on state-owned aquatic land. Accordingly, DNR recommends that WA DNR's Aquatic Resources Division be involved in any revegetation plan (or other habitat mitigation) taking place on or partially on state-owned aquatic lands.

"Proposed Action," Page 4.7-19-21 and "Operations-Direct Impacts," Page 4.7-27
This section discusses the placement of Docks 2 and 3 with respect to shading of habitats. In order to off-set (mitigate) for the loss or degradation of aquatic habitat and negative impacts to species due to increase of overwater structures (piles, conveyor, and two docks), there needs to be additional measures taken to avoid or minimize such impacts to existing aquatic habitat and species. These measures need to be analyzed in the FEIS to determine whether they will mitigate significant impacts.

"Potential Mitigation Measures," Page 4.7-35
There was mention of additional measures that may be provided by "project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action", as well as any measures included under Section 7 of the federal ESA with both the USFWS and the NMFS. Early coordination with the regulatory agencies and WA DNR is recommended to provide a well-planned and comprehensive project mitigation plan.

Fish, Page 4.7-22
The DEIS states that the majority of benthic, epibenthic, and infaunal organisms within the proposed dredge prism would be removed during dredging. It then states: "Recolonization by benthic, epibenthic and infaunal organisms would be rapid, and disturbed habitats would return to reference conditions following recolonization by benthic organisms" within 30-45 days. This is not true if the dredge prism is habitat for lamprey ammoceotes. Rapid recovery would be unlikely (USFW, 2008. Jolley et al, 2010). The FEIS should consider these more permanent impacts to lamprey habitat. The FEIS should also address the ability of epibenthic and infaunal organisms to persist under the regular maintenance dredging proposed for the facility.

The FEIS should also address the effect of propeller scour on recolonization. Section 4.5-28 of the DEIS notes that "the likelihood of temporary, localized increases in turbidity resulting from propeller wash is considered low based on the amount of dredging anticipated to be required to accommodate vessels at Docks 2 and 3." This suggests a relationship between the amount of dredging required and propeller induced disturbance of sediments that should be further explained. How often will maintenance dredging need to occur to minimize propeller scour from the largest vessels expected to call at the facility? The conclusion in Section 4.5 of the DEIS that vessels calling at Docks 2 and 3 would have sufficient depth to minimize the potential for prop-wash should also be revisited given that the proposed facility will have a depth of 43 feet and 80% of the vessels calling at the facility will be Panamax vessels, apparently with drafts of at least 42 feet (DEIS 2-16 n. 13; Table 4.5-13). The FEIS should address dredging, turbidity and scour assuming the largest vessels expected to call at the facility during all river conditions.

Under: "Cause Physical or Behavioral Reponses from Elevated Turbidity during Pile Driving and Dredge Disposal" (p. 4.7-23) - "The temporary increase in turbidity from the Proposed Action is expected to be short-term and would not result in chronic sediment delivery to adjacent waters. Construction-related dredging is proposed to occur from August 1 through December 31, when many fish species would be present in the study area." The FEIS should identify what methods will be employed to minimize impacts to fish present in the study area during this time frame, including a modified in-water work window (for example).

Under: "Operations—Indirect Impacts" (subsection),"Cause Fish Stranding from Vessel Wakes"(p. 4.7-31) - Under: "Fish Stranding" (p. 4.7-19) and "Operations—Indirect Impacts" (subsection),"Cause Fish Stranding from Vessel Wakes" (p. 4.7-31). "The Proposed Action would add 840 vessel transits to the Columbia River at full build-out, which would introduce additional permanent risk of fish stranding in the Columbia River. The document uses information for Barlow Point. However, Barlow Point is directly downstream from the Proposed Action and vessels would be slowing as they approach the docks and accelerating as they leave the docks, which could reduce the size of vessel wakes generated by vessels associated with the Proposed Action at Barlow Point. Other sites downstream of Barlow Point would be susceptible to increased risk of fish stranding because of the vessels associated with the Proposed Action" (p. 4.7-19). "Thus, it is likely that fish stranding associated with wakes from project–related vessels would occur because of the Proposed Action."(p. 4.7-32).

The FEIS should identify what shipping action associated with the proposed project (i.e., vessel portage timing) can take place to minimize fish strandings and how and to what level stranding can be mitigated.

Fish, Page 4.7-29

It is an inadequate argument to claim 'direct impacts resulting from a spill … would likely be minor because the amount … spilled would be relatively small.' Coal dust spills during transport are not uncommon. If a spill occurs when salmonids or eulachon are present, lethal and sublethal results are likely from dust clogging or abrading gills or increased turbidity impacting successful feeding, prey aversion and movement. An increase in concentration of suspended material from a spill or accumulated over time impacts benthic and epibenthic invertebrates – many that are important prey for these fish (Gregory, 2011. Bash et al, 2001. Newcomb and MacDonald, 1991).

Fish, Page 4.7-36:

The DEIS notes that "[d]redging in the Columbia River is identified as an activity of concern for eulachon conservation because this activity takes place in proximity to known and potential eulachon habitats. Dredging activities during the migratory and spawning period could entrain and kill adult fish, eggs, and larvae; bury and smother incubating eggs; or cause stress and disturbance that could contribute to decreased spawning success. (DEIS 4.7-15)." Given that dredging required by the project which may occur annually or more frequently as needed, (DEIS 4.7-32) and the potential for propeller scour from day-to-day operations, the description of proposed mitigation to protect Eulachon in DEIS Section 4.7-36 (surveys and future development of mitigation) is inadequate. Mitigation measures that are part of a proposal should be described in the FEIS. WAC 197-11-440(5)(c), 6(b), Without a description of what potential mitigation would be, agencies with jurisdiction cannot evaluate whether proposed mitigation would be sufficient, permissible, or otherwise capable of being accomplished.

Wildlife, Page 4.8-17

DNR disagrees with the conclusion in the DEIS that although mortality to amphibians will occur, "these species typically reproduce rapidly and any losses due to mortality would not be expected to affect the viability or fitness of the species' populations." In fact, although amphibians have existed over 300 million years, in just the last two decades over 170 species have gone extinct and 45% of the existing species have populations that are declining. Since amphibians lay eggs

along river banks that float on water surface, successful reproduction is threatened by direct impacts during construction, during dredging, from coal dust and vessel traffic as well as from indirect impacts from changes to water quality (Stuart et al, 2004).

Vessel Traffic- Section 5- Vessel Transportation and Vessel Transportation Technical Report and Section 6-23 Cumulative Impacts

The summary in the Vessel Transportation Section 5.4-35 states that there will be 1,680 vessel transits per year. To meet this standard, two vessels will need to be loaded per day 365 days a year. The FEIS should assess how malfunctions in and/or maintenance to loading mechanisms might slow this process and affect vessel traffic congestion. Additional concerns related to vessel congestion are based on the apparent size of the vessels that would call on the proposed facility. The DEIS provides that 80% of the vessels calling at the facility would be Panamax-class vessels, which, as described in the DEIS, have a draft of at least 42 feet (DEIS 2-16 n. 13). (See also Table 5.4-13 identifying the representative draft of Panamax vessels to be 13.3 meters, which is 43.6 feet.) The federal navigation channel in Columbia River is currently maintained at 43 feet except as limited by temporary shoaling. The Columbia River Harbor Safety Plan calls for all vessel movements to be planned to maintain an under keel clearance of at least 2 feet. As a result, the Columbia River Pilots' Vessel Movement Guidelines note that ships with a draft of 43 feet may be subject to substantial delays while transiting the river and at the Columbia River bar awaiting the proper tide and river levels to be present. Given that the proposal calls for 1344 additional Panamax-class vessel trips per year the EIS should examine the effect of scheduling the transits of largest vessels expected to call on the facility and the likely delays in those transits on vessel congestion on the river and associated risk of congestion related allisions (running one ship in another ship that is stationary), collisions, and groundings. The EIS should also describe air quality impacts related to congestion and how the risk of vessel congestion will be mitigated for.

<u>Chapter 6 Cumulative Impacts</u>

Water quality, vegetation, fish, wildlife from operations effects particularly from emissions of coal dust, continued maintenance dredging, shading from overwater structures and vessels (as described in the comments regarding Chapters 4 and 5) would only be more pronounced when considered cumulatively and should be assessed in the FEIS.

IMPACTS TO STATE-MANAGED LANDS IN THE LOWER COLUMBIA REGION

Chapter 4 Natural Environment
Geology and soils, Page 4.1-15
The DEIS suggests there is little risk of the operations of the project causing landslides but does not consider the potential increase in Columbia River bank failure, slumping or erosion from the increased in large vessel transport. This is a continuing issue in the lower Columbia, particularly in areas of Wahkiakum County (Babcock, 1989 & Wahkiakum County) and should be assessed in the FEIS.

Chapter 4 Natural Environment
Geology and Soils, Page 4.1-15
Landslides: Increased wet season precipitation and increased frequency and magnitude of extreme storms due to climate change is projected to increase the frequency of landslides. Please assess the likelihood of additional landslides on the project area and rail lines along the entire rail route or routes. If an increased likelihood of landslides is found, please assess the effect on the likelihood of derailment and spills into the Columbia River or other state-owned aquatic land or state-owned upland.

- If additional risk is identified, please provide appropriate mitigation measures for the Project Area and all relevant rail routes.

Water Quality, Page 4.5-23
The estimated deposition rate of 1.88 g/m2/year of coal dust input to the Columbia River and surrounding assumes no spills. This is an unrealistic assumption. BNSF estimates that 500 lbs. to a ton of coal can escape from a single loaded coal car. A recent examination of coal dust emissions from coal rail cars traveling through Washington indicate higher than anticipated emissions of coal dust, even though surfactants had been applied to control the dust (Johnson & Bustin 2006; Jaffe et al 2015). The FEIS should revise their deposition rate estimates to reflect these studies.

Water Quality, Page 4.5-25
Depending on the abundance of sulfide minerals in the coal, local acidification can result from coal dust entering water along the Columbia River. Although sulfur is not listed in Table 4.5-4 as an element of environmental concern, the Powder River Basin and Wyodak coal beds do contain sulfur (Stricker and Ellis, 1999) and should be considered in assessing water quality impacts in the FEIS.

Water Quality, Page 4.5-26
In order to fully address "water quality concerns" and other environmental issues, long-term effects need to be evaluated; including the potential for bioaccumulation. Coal dust suppressants should be evaluated in both freshly applied as well as aged and weathered forms. The potential for synergistic effects with coal dust should be examined in the FEIS (Tien and Kim, 1997; U.S. EPA, 2002).

Ocean Acidification
The SEPA Climate Change Technical Report claims that ocean acidification does not affect the project area. This is not true given that marine waters periodically reach the project area with shifting tides and should be assessed in the FEIS.

Fish, Page 4.7-29
It is an inadequate argument to claim 'direct impacts resulting from a spill … would likely be minor because the amount … spilled would be relatively small.' Coal dust spills during transport are not uncommon. If a spill occurs when salmonids or eulachon are present, lethal and sublethal results are likely from dust clogging or abrading gills or increased turbidity impacting successful feeding, prey aversion and movement. An increase in concentration of suspended material from a spill or accumulated over time impacts benthic and epibenthic invertebrates – many that are important prey for these fish (Gregory, 2011. Bash et al, 2001. Newcomb and MacDonald, 1991).

Fish, Page 4.7-29
The DEIS identified that source sound levels generated by the type of bulk carrier vessels transiting the Columbia River "…*exceed identified thresholds for potential behavioral disturbance for fish and may cause avoidance or other behavioral responses*." In addition to making fish more vulnerable to predation, avoidance behavior creates additional stressors that are not assessed in the DEIS.

Section 4.7.7.1 Applicant Mitigation states; "*There would be no unavoidable and significant adverse impacts.*" Considering a substantial number of large vessels would be adding to commercial traffic on the river (70 additional vessels per month, an increase of 44%) the DEIS completely neglects to assess potential impacts to fish as a result of the increase in bulk carrier traffic that will call on the new facility and does not support the conclusions of Section 4.7.7.1.

The DEIS (page 4.7-16) identifies the prominence of both green and white sturgeon as bottom feeders throughout the lower Columbia River. White sturgeon in particular use "…*a wide variety of habitats*." The lower Columbia River navigation channel is dredged to 43 foot depth. Panamax and Handymax class vessels have a draft of 36 feet and greater (DEIS Table 5.4-5) and are moving between 9 and 15 knots (DEIS, page 5.4-16). There appears to be a reasonable chance that the 1,680 annual additional vessel transits to and from the Millennium pier will be moving in very close proximity to the river bottom where both green and white sturgeon are likely to be present. Beyond recognizing the prominent occurrence of sturgeon and other fish in the area where shipping occurs, there is no discussion on the physical impacts to the fish. The DEIS should assess the potential extent of impacts of strikes from propellers and direct ship contact to fish, particularly sturgeon, and the extent that the increase in ship traffic noise increases stress levels of fish, breaks up schools and causes increased energy expenditure due to movement away from the disturbance, and how these impacts, if any, will be avoided and minimized.

Wildlife, Page 4.8-17
DNR disagrees with the conclusion in the DEIS that although mortality to amphibians will occur "these species typically reproduce rapidly and any losses due to mortality would not be expected

to affect the viability or fitness of the species' populations." In fact, although amphibians have existed over 300 million years, in just the last two decades over 170 species have gone extinct and 45% of the existing species have populations that are declining. Since amphibians lay eggs along river banks that float on water surface, successful reproduction is threatened by direct impacts during construction, during dredging, from coal dust and vessel traffic as well as from indirect impacts from changes to water quality (Stuart et al, 2004).

Vessel Transportation, Section 5.4.4.3

Section 5.4.4.3, Ship Casualty Survey (page 5.4-30) does not discuss commercial traffic incidents with recreational or commercial fishing vessels or projected increases with increased traffic and ship size. Same for the ability of Incident Management and Response Systems (page 5.4-32) to deal with increased traffic and larger ships (2,258 by 2028 and, from 3,862 current to 6,120 in 2028 table 5.4-14). The DEIS states: "Although vessel traffic volumes have been considerably lower over the past 11 years compared to the earlier peak years, vessel sizes and total cargo tonnages have increased in recent years" (page 5.4-19). "In general, the risks of spills would increase under the Proposed Action due to an increase in the number of vessels calling at the project area and the resultant increase to overall vessel traffic in the study area" (page 5.4.-43). "Although the likelihood of a serious incident is very low, there are no mitigation measures that can completely eliminate the possibility of an incident or the resulting impacts" (page 5.4-47). The FEIS should assess these potential impacts. As stated above, impacts related to vessel congestion should also be analyzed assuming the largest vessels expected to call on the facility and necessary delays associated with scheduling the transits of those vessels on the river.

Section 5.4.3.2 Impact Analysis

Regardless of where vessels refuel the risk of spills while bunkering is significant and the increased risk posed by increased bunkering required as a result of this proposal should be identified and quantified. Furthermore, potential mitigation measures should be identified and list what the proponent will do to mitigate reduce risk of bunkering spill.

Chapter 6-Cummulative Impacts

The Vessel Traffic Study needs to be further enhanced and presented as part of the DEIS providing more solid statistics on the level of risk posed by this action as well as mitigation measures that can be implemented to reduce imposed risk. These may include but are not limited to:

1. The need for tug escorts;
2. Improved vessel-traffic management and practices and;
3. Enhancing requirements for tug capabilities (including propulsion, equipment and operations) to ensure safe escort of vessels.

Appendix F: Rail and Vessel Corridor Information

The Draft EIS does not address the capacity of the existing vessel traffic management system to manage the risks associated with the projected cumulative increases in deep-draft vessel transits. The 1,680 deep draft vessel transits associated with the proposal represent a 44% increase over 2014 conditions, with projected cumulative 2028 and 2038 levels representing a 58% and 118% increase respectively. The risk associated with a significant increase in large commercial vessels transits is magnified by the potential for a parallel increase in oil transportation in the Columbia

River system. Although the "return period" for large scale accidents and/or spills is modeled to be relatively low, a large scale oil spill would have significant and long-term adverse impacts to state-owned aquatic lands and the larger lower Columbia River estuary ecosystem.

The recent Tesoro Savage Vancouver Energy Project Draft EIS indicated that the current lower Columbia navigation system had capacity to handle approximately 3,644 annual deep draft vessel transits.[2] Both the cumulative 2028 and 2038 projections associated with the Millennium Draft EIS significantly exceed this figure. The Final EIS should address existing vessel traffic management system capacity and identify necessary improvements to expand capabilities (e.g., available pilots and tug escorts) to ensure appropriate safeguards are in place. The Final EIS should also acknowledge the pending Department of Ecology evaluation of the vessel traffic management and safety within and near the mouth of the Columbia River (Section 11, Chapter 274, Laws of 2015). See Ecology's website (http://www.ecy.wa.gov/news/2016/025.html) for further details. It is speculative to imply that existing systems and capabilities are adequate until this study is completed. Although many recommendations from this study may pertain specifically to oil transportation, the Final EIS should adopt all relevant recommendations of this evaluation. Analyses should statistically compare potential increased vessel traffic from proposed oil transportation facilities along the Columbia (Tesoro-Savage EIS and others-see Table 6.2) with levels of traffic proposed and quantify increased level of spill risks posed, as well as any mitigation measures that should be recommended. Provide statistically significant results and potential volumes that could be released as a result of an incident whether it be a collision, allision, grounding, bunkering issue or otherwise. Although the summary states that risks were quantified, very little statistics are referenced throughout this report instead using broad terms such as 'low risk' and 'low probability' of a spill. In the summary and wherever risk of a spill is mentioned, risk should be described in terms of how often (every however many years) and number of potential gallons that could be spilled. Simplifying by only saying "low risk" trivializes the catastrophic impact a spill from these large vessels could have on the Columbia River's diverse and sensitive habitats adjacent to and downriver from this facility. The DEIS needs to provide in more definite terms the risk this proposal poses.

Vessel Wake

Projected project related and cumulative increases (44% and 118% increase above 2014 levels) in deep draft vessel traffic within the Lower Columbia River present potentially significant challenges for juvenile salmon. Existing levels of deep draft vessel wakes currently contribute to stranding of juvenile salmonids within the lower estuary and are identified as a limiting factor in the Lower Columbia River Recovery Plan for Salmon and Steelhead. Approximately 33 miles of the lower river have been identified as having shoreline characteristics that suggest vulnerability to wake induced stranding events. The Recovery Plan classifies the level of impact to juvenile ocean-type fry as a moderate population level effect; however, this is prior to projected increases in deep draft vessel transits. No estuary-wide estimates of mortality have been completed and additional research is needed to understand the full extent of this issue.

Given that wakes from deep draft vessels have been linked to observed stranding events, the FEIS should clearly differentiate between deep-draft vessel trips and total commercial vessels

[2] Tesoro Savage Vancouver Energy Distribution Terminal Facility Draft Environmental Impact Statement, November 2015; Ch3.14-31.

under both projected and baseline conditions to facilitate comparison of the potential impacts to ESA listed salmonids. The Lower Columbia Recovery Plan suggests that options for limiting the impact of vessel wake stranding are limited due to (1) potential loss of revenue that would result from speed reductions; and (2) the high costs associated with potential habitat modifications. If no mitigation is proposed – none is currently identified in the DEIS – then vessel wake induced stranding may warrant disclosure as an "unavoidable and significant adverse environmental impact" and compensatory mitigation measures proposed that include an assessment of the commercial and cultural value lost due to the impacts.

IMPACTS TO STATE-MANAGED LANDS STATEWIDE

Ocean Acidification

Ocean acidification and changes to marine and freshwater chemistry are of significant concern to the health of the environment. The analysis of the impacts from burning 44 million metric tons of coal per year on ocean acidification is overly simplified and does not appropriately consider potential cumulative impacts. Coal combustion produces many products including CO2, NOx and SO2. Nitrogen oxides and sulfur dioxide will transform in the atmosphere to strong acids such as nitric acid and sulfuric acid (HNO3 and H2SO4) that can affect the carbonate chemistry of marine waters. Further the term 'ocean acidification' overly simplifies the true complexity of the carbonate system which includes parameters such as dissolved inorganic carbon (DIC), alkalinity, pCO2, and pH. This should be a consideration in the FEIS.

More attention should be given to the impacts of burning 44 million metric tons of coal per year will have on carbonate chemistry globally, along coastlines adjacent to the project area and the potential cumulative biological impacts. There is a growing body of literature highlighting the impacts that ocean acidification may have on species that are both culturally, commercially and ecologically significant to the Pacific Northwest. This includes, but is not limited to, salmon, pteropod, shellfish and some harmful algal bloom forming species of diatoms and dinoflagellates. There should be a discussion of the cumulative impacts ocean acidification may have on the natural environment.

Anthropogenic climate change will likely cause moderate to severe declines in most west coast salmon, especially when interacting factors are incorporated into the analysis (e.g., existing threats to populations, water diversion, accelerated mobilization of contaminants, hypoxia, and invasive species). Salmon will adapt their behavior and possibly physiology, but these responses are unlikely to prevent long-term declines (NMFS, August 2015).

<u>Chapter 4 Natural Environment</u>

Vegetation, Page 4.6-22

The DEIS states impacts of coal dust on vegetation are variable and complex and have not been studied in the Pacific Northwest. Coal dust has been shown to reduce terrestrial and emergent plants ability to photosynthesize (Farmer, 1993) and should be addressed in the FEIS.

Fish, Page 4.7-29

It is an inadequate argument to claim 'direct impacts resulting from a spill … would likely be minor because the amount … spilled would be relatively small.' Coal dust spills during transport

are not uncommon. If a spill occurs when salmonids or eulachon are present, lethal and sublethal results are likely from dust clogging or abrading gills or increased turbidity impacting successful feeding, prey aversion and movement. An increase in concentration of suspended material from a spill or accumulated over time impacts benthic and epibenthic invertebrates – many that are important prey for these fish (Gregory, 2011. Bash et al, 2001. Newcomb and MacDonald, 1991).

Wildlife, Page 4.8-17

DNR disagrees with the conclusion in the DEIS that although mortality to amphibians will occur "these species typically reproduce rapidly and any losses due to mortality would not be expected to affect the viability or fitness of the species' populations." In fact, although amphibians have existed over 300 million years, in just the last two decades over 170 species have gone extinct and 45% of the existing species have populations that are declining. Since amphibians lay eggs along river banks that float on water surface, successful reproduction is threatened by direct impacts during construction, during dredging, from coal dust and vessel traffic as well as from indirect impacts from changes to water quality (Stuart et al, 2004).

<u>Chapter 5 Operations</u>

Rail Transportation, Section 5.1

DEIS Section 5.1.8 states: "*Without improvements to increase capacity the rail line routs for the proposed action (the Reynolds Lead; BNSF Spur; and three segments on the BNSF main line routes in Washington State (Idaho/Washington State Line–Spokane, Spokane– Pasco, and Pasco–Vancouver) are not projected to have the capacity to handle the projected baseline rail traffic and Proposed Action-related rail traffic in 2028. BNSF could address capacity issues with capital improvements or operational changes, but it is unknown when these actions would be taken or permitted. Therefore, with existing infrastructure and using the methods to identify potential baseline rail traffic in 2028, the Proposed Action could result in a significant adverse environmental impact on rail transportation.*"

The economic effects of these impacts on the ability of state agriculture products to get to market is not considered in the discussion. The FEIS should discuss how current and future rail line capacity needs will affect current state agricultural markets and the ability for getting Washington's agriculture crops to market using the current rail infrastructure.

Rail Safety, Section 5.2

Existing rail transportation is a consistent cause of wildland fires due to sparks emitted from train wheels in contact with rail tracks. Rail spark emissions can – and regularly do – ignite fires in vegetation adjacent to rail lines. The DEIS does not address the increase in numbers of wildfire starts that are likely due to the additional 16 "unit trains" (125 rail cars each) per day. The rail lines designated for transporting coal from markets and for empty-car backhauls traverse areas of the state that are particularly wildfire-prone, especially during extended periods of hot dry conditions. The empty backhaul route for BNSF trains moves east over Stampede Pass, an area that is remote and difficult to access for wildfire response. The DEIS should address likely increases in wildfires and potential mitigation for wildfire risk due to the increase in rail traffic.

Also missing from the Rail Safety section was any mention or analysis of increased need for emergency response in the event of a derailment, accident or spill along the rail transportation routes. DNR's Wildfire Program serves a statewide Emergency Support Function (ESF 4) for not only wildfires, but all-hazards emergency response with incident command and response resources if needed. The potential increase in emergency response (in which DNR and other emergency response agencies may have significant roles) along the rail transportation routes should be acknowledged, and potential mitigation should be addressed in the FEIS.

Coal Dust, Page 5.7-2

Compared to other measures of coal dust from rail cars and accumulation of coal dust at sites 5 miles away, as has been observed at the Point Roberts terminal in Canada, the application of surfactants to control dust adds the impacts from these chemicals when coal dust is blown or spilled during transport (Jaffe et al, 2015. Johnson & Bustin, 2006). This impact should also be assessed. In addition, there should be an analysis of the potential health and environmental effects from resuspension of accumulated coal dust from regular rail traffic.

The DEIS does not include an analysis of urban forest health along potential rail routes. The following mitigation, restoration and enhancement activities should be considered in the FEIS:

- It is difficult to predict the amount of cumulative coal dust deposition on vegetation or how that will affect trees within the impact area. The report states that dust will be minimized through mitigation techniques and that the dust emission will be below an unacceptable level. There does not appear to be a monitoring plan in place to determine impact, or to mitigate impacts should they be discovered. A monitoring plan should be developed in urban areas to assure the health of urban trees and address issues that may arise.
- Adjacent to the project area, there should be consideration of the potential to plant a large-tree vegetative screen to aesthetically enhance the area, help to capture aerial dust, and act as a sound and light barrier between the project site and residential areas.
- Since vegetation will be maintained along the perimeter road, rail tracks, and rail loop, the loss of trees could be mitigated by planting trees, monitored through establishment, on the outside of the maintenance perimeter, particularly in proximity to residential areas.

Greenhouse Gas Emissions and Climate Change, Page 5.8-1-33

There has been significant investment by Washington state natural resource agencies and Tribal governments to plan for, investigate and respond to the following effects of climate change. For example; DNR is building and deploying ocean acidification sensor packages throughout the nearshore waters of WA to collect data on pH and water quality changes resulting from climate change that affect ecologically and commercially important species. DNR is also investigating the potential to strategically culture aquatic plants to increase pH of acidified waters. These efforts and investments of citizen dollars and further investments by state and local government required to respond to continued production of greenhouse gases should be considered in the project's economic analysis.

The projected 37.6 million metric tons of greenhouse gas emissions associated with facility construction and operation over a 20-year period is inconsistent with state policy[3] to reduce fossil fuel dependence, promote clean energy technologies, and mitigate the potential for catastrophic and irreversible impacts to natural resources. Global climate change presents serious environmental challenges including, but not limited to, ocean acidification, sea level rise, warming water temperatures, decreased snowpack, and increased wildfire danger. Climate change is already having profound ecological and economic consequences in the region. Human contributions to ocean acidification in the Pacific Northwest are quantifiable and have increased the frequency, intensity, and duration of harmful conditions.[4] Washington marine waters and ecosystems are identified as "particularly vulnerable" to the effects of ocean acidification – a fact emphasized by recent larvae production failures at Pacific Northwest oyster hatcheries.[5] These waters support a $270 million aquaculture industry and a larger $1.7 billion seafood industry. Although the DEIS proposes to mitigate 50% of associated emissions, the financial and technological feasibility of achieving reductions of that scale is unknown at this time since the mitigation plan has yet to be developed. All unmitigated large-scale greenhouse gas emissions associated with coal exports will be at odds with the 2012 Washington State Blue Ribbon Panel on Ocean Acidification recommendations to address the causes and consequences of ocean acidification.

The DEIS states, "Washington State law requires annual greenhouse gas emissions to be reduced to 1990 levels (88.4 million metric tons of CO2e) by 2020 (Revised Code of Washington [RCW] 70.235.050). The Washington State goal represents an annual reduction of 3.6 million metric tons of CO2e below the 2012 state emissions levels. The statewide annual emissions associated with the Proposed Action under the 2015 Energy Policy scenario is approximately 0.4 million metric ton of CO2e and represents about 11% of the emissions reduction goal."

Please note that the DEIS text only discusses emission reduction obligations for 2020. However, the state is obligated to continue reducing over time, to 25% below 1990 levels by 2035, and to 5 below 1990 levels by 2050.

- The DEIS statement that the Proposed Action represents 11% of the emissions goal is incorrect in two ways. First, it represents an increase of 11% at the 2020 mark (not 11% of the reduction goal). Second, because the State's emissions reduction obligation is progressive, the Proposed Action represents an increasing proportion of the state's carbon emissions over time. Please calculate this amount at relevant time steps throughout the life of the Proposed Project.

- **MM GHG-4. Mitigate for Impacts on Washington State from Net Greenhouse Gas Emissions Attributable to the Proposed Action.** The calculations for this section should

[3] Executive Order 14-04 *Washington Carbon Pollution Reduction & Clean Energy Action* and Executive Order 12-07 *Washington Response to Ocean Acidification.*

[4] NANOOS, NOAA Ocean Acidification Program, Ocean Carbon & Biogeochemistry Project; UW Washington Ocean Acidification Center, Washington Sea Grant, and West Coast Ocean Acidification & Hyoxia Science Panel. Ocean Acidification in the Pacific Northwest. May 2014.

[5] Washington State Blue Ribbon Panel on Ocean Acidification (2012): Ocean Acidification: From Knowledge to Action, Washington State's Strategic Response. H. Adelsman and L. Whitely Binder (eds). Washington Department of Ecology, Olympia, Washington. Publication no. 12-01-015.

reflect the proposed project's increasing percentage of the state's carbon emissions over time, and thus the increasing mitigation rate that is necessary to mitigate for it.

NEPA draft guidelines can provide a frame of reference into important issues that should be analyzed in an environmental review process. And although not required under SEPA, doing so in the DEIS would be a good idea and in the best interest of the public. Agencies can incorporate by reference applicable agency emissions targets such as applicable federal, state, tribal, or local goals for GHG emission reductions to provide a frame of reference and make it clear whether the emissions being discussed are consistent with such goals.

For proposed projects emitting more than 25,000 metric tons of carbon dioxide equivalent, federal NEPA greenhouse gas and climate change draft guidance (Dec 2014) supports quantitative assessments of both the potential effects of a proposed action on climate change as indicated by its GHG emissions; and the implications of climate change for the environmental effects of a proposed action. The DEIS estimates that the total net emissions related to the proposed project from 2018 to 2038 would be 37.6 million metric tons of CO2e. This is above the threshold of 25 million metric tons of CO2e, indicating that climate change should be considered by the FEIS. Thus, these comments reflect considerations for assessing the proposed project's GHG emissions and the implications of climate change of the proposed action. The FEIS analysis should consider utilizing the following NEPA guidelines when assessing GHG emission impacts:

1. When assessing direct and indirect climate change effects, agencies should take account of the proposed action – including "connected" actions – subject to reasonable limits based on feasibility and practicality. In addition, emissions from activities that have a reasonably close causal relationship to the federal action, such as those that may occur as a predicate for the agency action (often referred to as upstream emissions) and as a consequence of the agency action (often referred to as downstream emissions) should be accounted for in the NEPA analysis.

    a. It is unclear if the DEIS considers the full range of "connected" actions when assessing GHG emissions from construction, operation, and use of the coal in Asia. Please clarify and ensure that the full range of connected actions are considered.

2. Monetizing costs and benefits is appropriate in some cases and is not a new requirement.

    a. For DNR and Washington State, an example of the cost of climate change is it being considered a contributing factor to the 2015 Wildfire season, during which more than 1 million acres burned in Washington and the total firefighting cost was at least $347 million.
    b. Additional climate related costs to the state include losses due to the 2015 drought, losses from flooding due to increased peak flows, and protections from sea level rise.
    c. Please consider all of these costs in the FEIS.

3. The "Federal social cost of carbon" offers a harmonized, interagency metric that can provide decision makers and the public with some context for meaningful NEPA review.

a. The DEIS does not provide an assessment of the social costs of carbon for the proposed project. Please include this in the FEIS.

5.8.2.8: Climate Change impacts:
The implications of impacts addressed in this section (e.g., low flow, high flow, flood inundation, and wildfire) should be included in the previous sections assessing these issues (especially Section 4). These impacts are relevant to the assessment of the project and should not be separated. Please consider climate conditions and impacts through the end of the project's life to assess risks for the project.

In addition, please address the following:

- Increased landslides due to climate change impacts, including increased wet season precipitation and increased frequency and magnitude of extreme storms.
- Effects on hydrological dynamics due to sea level rise, increased peak flow, reduced low flow, increased wave energy, increased scouring, and other water related changes to impact hydrological dynamics over the life of the project
- Effects on point and non-point discharge due to increased frequency and magnitude of extreme storms over the life of the project
- Effects on stormwater and wastewater discharge related to seasonal flow changes due to climate change over life of project. Increased extreme storms can flush toxics in large plumes. Seasonal low flows can reduce dilution, causing increased toxicity.
- Effects on wildfire related to 1) increased ignitions due to increased sparks from rail lines (due to increased rail traffic) and 2) longer, hotter, drier fire season due to climate change.
- Overall, consider changing risk profiles (usually increasing risk) over the life of the project. If the facility may persist beyond the currently defined life of the project, what modifications will be needed to prevent future harm?

In all cases, if the risk of environmental harm increases due to inclusion of these impacts, please provide appropriate mitigation measures. DNR recommends that as the applicant develops a greenhouse gas emissions mitigation plan as discussed in section 5.8, page 22, they consider converting current public facilities that burn fossil fuels to either wood chips or wood pellet heating systems. These funds could be managed by the Washington State Department of Commerce to pay for the conversion of fossil fuel energy systems to wood energy systems at public facilities. This action will have three primary benefits:

1. Converting to wood energy systems will reduce greenhouse gas emissions;
2. utilizing low-grade wood chips or pellets will help provide a market for small trees that must be removed to reduce wildfire risk which they identified as potential risk to the project in 5.8-32; and
3. Combusting woody biomass in efficient, modern boilers will reduce particulate emissions compared to slash pile burning or wildfires.

ADDITIONAL COMMENTS TO THE DEIS FOR CONSIDERATION:
Project Objectives, Proposed Action, and Alternatives

Section 2.1.1 Enable Western U.S. Coal to Compete in the Pacific International Coal Supply Market
Section 2.1.1 states: "*Further development of western U.S. coalfields and the growth of Asian market demand for U.S. coal is expected to continue, and existing West Coast terminals are unavailable to support this need. To derive benefit from economies of scale, implementation of the Proposed Action would provide a coal export terminal sufficient in throughput to give U.S. coal producers the opportunity to expand their share of the international coal market.*"
Section 2.1.2 states: *The Applicant states the Proposed Action would support the diversification of Washington State's trade-based economy by providing a new coal export terminal to accommodate the anticipated growth in demand for the export of U.S. coal.*

The basic assumption on which the project objectives are based, "…demand for U.S. coal is expected to continue…" is no longer valid and should be reassessed based on current market conditions. According to the Energy Information Administration coal exports from the United States are projected to decline significantly over the next few years. According to the EIA, lower overseas mining costs, cheaper overseas transportation costs, and favorable exchange rates are expected to continue to provide a competitive advantage to mines in other major coal-exporting countries. Coal exports in February 2016 were 31% lower than in February 2015. The EIA forecasts U.S. coal exports to decline by 20% in 2016 and by an additional 4% in 2017. Forecast coal production is expected to decrease by 17% in 2016 alone, which would be the largest decline in terms of both tons and percentage since data collection started in 1949. (EIA Short Term Energy Outlook, May 2016). These factors have had a significant impact on coal production in the United States. In January 2016, Arch Coal Inc. which owns 38% of the proposed Millennium facility, filed for bankruptcy (The Wall Street Journal, January 11, 2016) as a result of a major decline in the demand for coal in the Asian market. Since this time, Peabody Energy, the largest coal company in the U.S. also filed for bankruptcy. This followed bankruptcy filings by Alpha Natural Resources Inc., Patriot Coal Corporation and Walter Energy Inc. (The Wall Street Journal, April 14, 2016). Reuters (January 11, 2016) stated; "*Producers accounting for more than 25 percent of U.S. coal are currently in bankruptcy, based on 2013 government figures of major U.S. coal companies' production.*" China and India, both projected to be larger coal consumers of the coal, have lost interest in importing coal and will increase reliance on domestic coal (Crosscut, May 5, 2016). Accordingly, the project objectives should be reassessed based on a realistic evaluation of current and projected future market conditions.

.

Chapter 3: Built Environment

Section 3.2: Social and Community Resources
The projection of potential direct, indirect, and induced economic and fiscal benefits of the proposal are based on the 2012 study *Economic and Fiscal Impacts of Millennium Bulk*

Terminals Longview prepared by BERK. (DEIS 3.2-5). The potential direct, indirect and induced economic and fiscal benefits of the proposal should be reassessed based on current information. As noted above, the downturn since 2012 in the outlook for U.S. coal exports and the domestic coal industry generally is well documented and expected to continue for the foreseeable future. According to the Energy Information Administration, for example, there was a 24% decline in coal exports from the United States between 2014 and 2015 alone. (EIA, Quarterly Coal Report, October-December 2015). As discussed above, the rapid decline in coal prices has resulted in a succession of bankruptcy filings by the top coal producers in the United States in 2015 and 2016. Accordingly, projections of benefits from the project based on the substantially more favorable economic outlook for coal in 2012 are misleading and should be re-examined.

Section 3.4: Cultural Resources

A fundamental problem with the DEIS in terms of cultural resources is that it fails to provide data sufficient to judge whether and to what degree there could be adverse effects to archaeological resources and to traditional cultural properties. The DEIS's reliance on reports not included in the Appendix is troubling, and a comparison of methodologies and conclusions as described in the original (which is in fact on file at DAHP) and as characterized in the DEIS shows that the latter includes significant errors and misinterpretations that result in the DEIS under-estimating the potential for archaeological resources and for adverse effects to them.

Based on the AECOM archaeological report, it is clear that there is potential for archaeological deposits as shallow as 1 foot beneath the modern ground surface, well within the reach of conventional archaeological methods. Prior to any action, DNR recommends a much more thorough archaeological investigation, because without that we do not know what is present, and therefore cannot discuss potential adverse effects or mitigations.

<u>Specific comments</u>:

Section 3.4

Categories of cultural resources are inconsistent with National Historic Preservation Act (NHPA) and its regulations in 36CFR800. For reasons not explained, "Traditional Cultural Property" category has been split into "Culturally Significant Property" and "Tribal Resources," the latter being addressed in a different section.

Section 3.4.1

The list of federal laws is limited to the National Register of Historic Places (NRHP), which is a component of the NHPA, but not the entirety. The list omits other potentially relevant laws, including (but not limited to): 36 CFR 800, Archaeological Resources Protection Act, Native American Graves Protection and Relocation Act, American Indian Religious Freedom Act, Abandoned Shipwreck Act, and various Executive Orders.

Section 3.4.2

Since this is a federal undertaking subject to the NHPA, the "Study Area" should be formally defined as an "Area of Potential Effect" (APE). The Study Area fails to include areas subject to potential effect due to terminal construction, such as spoils disposal areas, fill sources (for

example, borrow pits or quarries), and haul routes. If there are in fact no such areas beyond the mapped polygon, this should be stated clearly.

Section 3.4.3.1
There is a series of 1942 aerial orthophotos that should be examined as well. The much-cited AECOM report is not in the appendix, making it difficult to evaluate DEIS summaries and characterizations. The AECOM report shows that geotech corings are unevenly distributed, and do not cover many areas within the study area.

Geotech cores alone are not sufficient to evaluate archaeological potential, especially as the DEIS does not make clear what level of archaeological expertise was brought to bear in their analysis. The AECOM report mentions shovel probes that provide more useful archaeological data than geotech cores, but these results are omitted from the DEIS. An "archaeological work plan" is mentioned, but none of its elements are described. Later in the DEIS, it appears that there are no plans for further archaeological investigation prior to construction.

Section 3.4.3.2
The cited model is insufficient to address effects in the water and in certain portions of the study area due to absence of geotech coring data in those areas. The phrase "indicated potential for direct impacts on cultural resources" is left unexplained, yet leaves wide latitude for concern.

Section 3.4.4.1
Throughout this section, there is a failure to relate the contexts to the project area. What do the known prehistoric, ethnographic, and historic contexts mean in terms of archaeological expectations in the project area? What kinds of artifacts and features might be expected, and from which time periods?

The prehistoric context lists several phases based on lithic artifacts, but fails to mention that the Columbia River was one of if not the most heavily populated areas in prehistoric North America. The full range of site types could be present, dating back to over 14,000 years ago. This section skips some of the best information from the AECOM report. In particular, there is a gap between 1850s settlement (no mention of the adjacent Donation Land Claim, for instance) and industrialization in the 20th Century.

Section 3.4.4.2
It is difficult to understand how landfills and fill deposits were determined NRHP eligible. Text mentions that USGS and GLO maps support the interpretation that the project area was formerly a wetland, but fails to show this with georeferenced overlay maps. The text should be revised to say Holocene Epoch (not "epic").

Conclusions about the depositional environment as described in this DEIS are internally contradictory. For example, the documents states there is no evidence of soil formation within the 70 feet of alluvium, but then states that soil characteristics indicate that it was a wetland.

The FEIS departs from data included in the AECOM report with regard to the potential for buried soil horizons, which are settings in which archaeological materials are more likely, and

where impacts could be most adverse. The AECOM report mentions layers that appear to be buried stable surfaces at 1-2 feet below current ground surface, but the DEIS omits these references, states there is no evidence of soil development, and states that the shallowest expressions of native (non-fill) sediment is 5-10 feet below current ground surface.

Both the AECOM report and the DEIS claim a diminished potential for cultural resources in the area based on the conclusion that it was a wetland, but they fail to address two key questions: Was the area a seasonal or year-round wetland? And is there evidence that the wetland was present throughout the span of potential human presence in the area? Seasonality and antiquity of the supposed wetland both have implications for archaeological expectations. There is mention that some organic layers were dated radiometrically, but no mention of the results.

Section 3.4.4.4
There is no such category as "culturally significant properties" in a Section 106 evaluation.

Section 3.4.4.5
Rail and vessel corridors include a long stretch of the Columbia River and its shorelines. This was a major prehistoric population center, and nearly the full range of site types could be present. This section does not communicate this information and should be addressed in the analysis.

Section 3.4.5
Besides the potential that the area was not a wetland throughout the Holocene or during all seasons, the DEIS fails to recognize that wetlands and river bedlands have potential for several types of archaeological sites, including fish weirs and traps, marsh gardens, and accumulations of sinker stones. The DEIS says that none of the activities with potential for impact would "yield sediment for observation," yet states that an Unanticipated Discovery Plan (UDP) would be implemented, and in a later section says that archaeological monitoring would be done.
The DEIS says that there cannot be indirect construction impacts, since construction will be limited to the project area. As mentioned previously, it is likely that the real APE will include additional areas due to fill introduction, spoils dumping, and haul routes, at a minimum.
The DEIS implies that an UDP will resolve any direct impacts from operations, but is unclear how. The discussion of operational direct impacts fails to address underwater effects such as dredging, wakes, moorage or anchoring, and prop wash. The discussion of operational indirect impacts fails to address sea level rise as all this coal is burned. On a more immediate level, the effects of coal dust as carbon introduced into archaeological sites would be to complicate and perhaps preclude radiometric dating. The operational indirect impacts were "assessed qualitatively," but there is no explanation of what that means, or which qualities were used.
As noted in the comments regarding Section 3.4.4.5 above, the Rail Corridor impacts section fails to address the potential effects of coal dust (see radiometric dating comment above) or of derailments on the pervasive nature of archeological significant sites along the proposed rail routes. The Vessel Corridor section fails to address underwater effects such as dredging, wakes, moorage or anchoring, and prop wash. It also contains the unexplained and unsubstantiated claim that there will be no wake-caused erosion "because individual site conditions would inhibit, reduce, and or minimize vessel wake energy." What are these conditions, and how do they inhibit, reduce or minimize?

Section 3.4.7.1
The main mitigation measure is to have an archaeological monitor for excavations deeper than 10 feet below modern ground surface. However, the AECOM report cites native sediment and possible stable soil horizons at 1-2 feet below surface, and even the DEIS states that native sediments begin at 5-10 feet. Monitoring itself is insufficient, since inadequate subsurface archaeological survey has occurred.

Chapter 4: Natural Environment
Definition of "INDIRECT IMPACT" on page 4.0-3 is lacking. Not only are indirect impacts considered those impacts that are "beyond the project area" as stated in the draft DEIS, but also those impacts that occur later in time, and beyond boundaries of site to include systems affected by project (U.S. Department of Transportation).

Chapter 8 Required Plans, Permits and Approvals
There is no mention at all of DNR approval in Table 8.1 for new or updated lease authorization under state approvals or permit list. There is no mention at all of DNR approval for new or updated lease authorization under state approvals or permit list Intro Materials FS-4. Reference to DNR approval necessary for dredging on state owned aquatic lands (both within and outside the lease area) should also be included.

REFERENCES

Babcock, S. J. 1989. Side slope sedimentation following new work dredging on the Lower Columbia River, Oregon and Washington. Masters Thesis, San Jose State University.

Bash, J., C. H. Berman, and S. Bolton. 2001. Effects of turbidity and suspended solids on salmonids. University of Washington Water Center,

Beland, K. F., J. G. Trial and J. F. Kocik. 2004. Use of riffle and run habitats with aquatic vegetation by juvenile Atlantic salmon. North American Journal of Fisheries Management 24: 525-533.

Farmer, A. M. 1993. The effects of dust on vegetation – a review. Environmental Pollution 79: 63-75.

Gregory, R. S. 1993. Effect of Turbidity on the Predator Avoidance Behavior of Juvenile Chinook Salmon (*Onchorynchs tshawytscha*). Canadian Journal of Fish and Aquatic Science 50(2):241-246.

Crozier, L. 2015. Impacts of Climate Change on Salmon of the Pacific Northwest. National Marine Fisheries Service, NW Fisheries Science Center, Fish Ecology Division.

Jaffe, D. et al. 2015. Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA. Atmospheric Pollution Research 6.6: 946-952.

Johnson, R. and R. M. Bustin. 2006. Coal dust dispersal around a marine coal terminal (1977-1999), British Columbia: the fate of coal dust in the marine environment. International Journal of Coal Geology 68.1: 57-69.

Jolley J.C., G. S. Silver, and T. A. Whitesel. 2011. Occurrence, detection, and habitat use of larval lamprey in Columbia River mainstem environments: Bonneville reservoir and tailwater. 2010 Annual Report Whiteselk; U.S. Fish and Wildlife Service Columbia River Fisheries Program Office 1211 SE Cardinal Court, Suite 100 Vancouver, Washington 98683.

Nedeau, E. J., A. K. Smith, and J. Stone. 2005. Freshwater mussels of the Pacific northwest. US Fish and Wildlife Service, 2005.

Newcomb, C. P. and D. D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. N. American Journal of Fisheries Management 11:1:72-82.

Rondorf, D. W., G. L. Rutz, and J. C. Charrier. 2010. Minimizing effects of over-water docks on federally listed fish stocks in McNary Reservoir: a literature review for criteria. US Geological Survey, Western Fisheries Research Center, Cook, Washington.

Stricker, G. D., and M. S. Ellis. 1999. Coal quality and geochemistry, Powder River Basin, Wyoming and Montana. Resource Assessment Professional Paper.

Stuart, S. N. et al. 2004. Status and trends of amphibian declines and extinctions worldwide. Science 306: 1783-1786.

Tien, J. C. and J. Kim. 1997. Respirable coal dust control using surfactants. Applied Occupational and Environmental Hygiene 12:12957-963.

United States Environmental Protection Agency. 2002. "Avoiding Another Times Beach. Potential Environmental Impacts of Dust Suppressants" An expert panel summary Las Vegas, Nevada May 30-31, 2002; University of Nevada, Las Vegas. Accessed on January 17, 2013 at: http://www.epa.gov/esd/cmb/pdf/dust.pdf

U.S. Fish and Wildlife Service. 2008. Proceedings of the Pacific Lamprey Initiative Work Session, Portland, Oregon.

Littell, J. S., et al. 2009. The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate-Executive Summary. The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate.

Washington State Department of Transportation

Transportation Building
310 Maple Park Avenue S.E.
P.O. Box 47300
Olympia, WA 98504-7300
360-705-7000
TTY: 1-800-833-6388
www.wsdot.wa.gov

June 13, 2016

Millennium Bulk Terminals – Longview SEPA DEIS
c/o ICF International
710 Second Avenue Suite 550
Seattle, WA 98104

RE: SEPA Draft Environmental Impact Statement (DEIS) on Millennium Bulk Terminals – Longview Comments

Dear Co-Leads:

Thank you for providing the Washington State Department of Transportation (WSDOT) with this opportunity to comment on the State Environmental Policy Act (SEPA) Millennium Bulk Terminals – Longview (Millennium) Draft Environmental Impact Statement (DEIS). WSDOT's responsibility to Washington's citizens is to provide a safe and efficient transportation system that supports our economy, communities, and the environment. It is therefore essential for the agency to ensure that proposed actions that can adversely impact this mission are carefully assessed to identify conflicts and necessary mitigation strategies.

With respect to the Millennium proposal, WSDOT's comments will focus on potential impacts to state highway and rail operations.

State Highway System

WSDOT's scoping comments provided to the lead agencies on November 14, 2013 requested that the DEIS address impacts to state highway railroad grade crossings and how increased delays at crossings near state highway intersections and interchanges may impact those highways. While the DEIS did address some of these impacts, additional analysis of the impact of Level of Service (LOS) to the transportation network should be provided in the Final EIS.

Page 5.3-13 of the DEIS notes that vehicle queuing will extend to nearby intersections. However, there is no analysis of these intersections, nor is there an analysis of the impacts to the streets that cross at these intersections. Likewise, Page 5.3-32 analyzes the delay of vehicles at the railroad grade crossings, but not at the nearby intersections. Several grade crossings are close together and will be closed simultaneously. Four private crossings are immediately adjacent to SR 432 and with essentially no queueing space between the railroad and the state highway, WSDOT believes that train traffic over these crossings would back up traffic too, and impact, the state highways. WSDOT requests the analysis includes all queuing information for the interim and full build out scenarios and the associated LOS.

Additionally, railroads often "fleet" trains in single-track territory. In order to increase track capacity, rail dispatch will run multiple closely spaced trains in one direction, then run multiple closely spaced trains in the other. By doing so, multiple trains could run on the same section of track at the same time, as they are

going in the same direction. Part of the improvements proposed by the Longview Switching Company is implementation of this type of dispatching. WSDOT is concerned that trains could be stacked, not permitting vehicle queues to clear between trains.

The Longview Switching Company may make improvements, such as track upgrades, if and when they determine these improvements are warranted. These improvements would result in an increase of the speed limit in this area from 10 MPH to 25 MPH, and permit trains to be spaced closer together. The higher speed limit would result in a shorter gate-downtime at the crossings. WSDOT believes that it is unlikely that a loaded coal train will significantly accelerate in that short distance only to slow down again. Please provide the analysis that trains can and will actually be travelling at speeds up to 20 MPH at these crossings. If this will not be the case, please determine how fast they will be travelling at these crossings and analyze the impact at these crossings and the adjacent intersections. Likewise, if the proponent knows of specific timing for the upgrade, that information should be added and the ramifications of that upgrade analyzed.

A discussion of delay to emergency vehicle response is on Page 5.3-36 of the DEIS. The total gate downtime would increase 130 minutes per day at the public crossings. The DEIS should disclose that the Oregon Way crossing is the only practical route between Rainier and other Oregon communities and medical facilities in Longview. This may warrant a change in the indirect impacts study related to Social and Community Cohesion and Public Services (Chapter 3.2 of the DEIS). Also, multiple accesses to the Weyerhaeuser mill could easily be blocked at the same time by the same train. Please provide a response on how emergency service response time and access can be mitigated in the interim and full build out scenarios. Pedestrian and bicycle safety at highway intersections impacted by increased vehicle delay also needs to be analyzed, and mitigation discussed in the Final EIS.

The basis for the safety threshold described in Chapter 5.3.3.2 and elsewhere is unclear and requires explanation. The Accident Prediction Model is a prioritization tool for allocation of funds between safety projects. The Final EIS should be cautious in suggesting that a model threshold would define a safe versus unsafe crossing.

Given our concerns identified, WSDOT believes that the impact of this proposal will be significantly greater than identified in the DEIS, and the proposed mitigation measures are inadequate. WSDOT respectfully requests additional mitigation based on the additional analysis needed, as identified above.

Rail Operation Impacts

The Washington State Rail Plan capacity analysis relied on 2010 data from the Freight Analysis Framework as well as 2012 data from the Carload Waybill Sample. While the DEIS does acknowledge and describe some limitations of the Washington State Rail Plan, WSDOT has some concerns with the DEIS reliance on the 6 year old data presented in the plan as well as the application of the data. The State Rail Plan data is derived from aggregate data intended to illustrate order of magnitude. Additionally, **infrastructure** changes to the freight rail system **have occurred** since 2010 **and** should be included in the analysis. The Final EIS should consider this and adjust the analysis as appropriate.

The DEIS states that impact to rail transportation by 2028 could be significant on several sections across the state but the implementation of mitigation measures is unclear. As a result, the Final EIS should make sure to include both recent and future improvement to the rail network that are planned or contemplated. The Final EIS should also identify mitigation strategies or an ongoing monitoring process to ensure

improvements are made to address impacts. Additionally, it is unclear if host railroads were consulted or if they provided relevant information for the analysis.

The cumulative impacts analysis should include the use of Stevens Pass as a viable alternative for some increased train volume frequencies. The cumulative impact analysis should also review the possibility that the coal terminal could be fully operational and at peak capacity much sooner than the projected date. While the impacts may not necessarily be different, the timeline for impact mitigation would be.

Please see our specific comments attached. We look forward to working with Washington Department of Ecology and Cowlitz County, the SEPA co-lead agencies, on addressing our comments in the Final EIS. Please contact me at (360) 705-7480 if you have any questions or would like to discuss any of these comments.

Sincerely,

Megan White, P.E., Director
Environmental Services Office

MW:vb

Enclosure: WSDOT comments

Attachment --WSDOT Comments on the Millennium Bulk Terminals-Longview Draft EIS

#	Chapter & Section (page number)	Comment	Reviewer
1	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	DEIS place heavy reliance on the State Rail Plan (SRP) and Freight Mobility Plan (FMP). • SRP data is from 2010 and derived from aggregate data intended to illustrate order of magnitude. • Freight rail world has changed since 2010.	Jason Beloso
2	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	Unclear whether host railroads were consulted or provided relevant information for the analysis.	Jason Beloso
3	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	Expected routes of empty BNSF trains only shows Stampede Pass. Direction running via Stampede Pass is preferred; Stevens Pass may also be used as an alternate route. Please analyze.	Jason Beloso
4	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	The DEIS says the impacts to rail transportation by 2028 could be significant on several sections across the state (5.1-24). As a result the DEIS should include both recent and future improvements to the rail network that are planned or contemplated.	Chris Herman
5	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	Significant impacts to rail operations were identified. The EIS should identify mitigation strategies or an ongoing monitoring process to ensure improvements are made to address impacts.	Chris Herman
6	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	Two of the existing grade crossings are on SR 432. Additional analysis of the impact to the Level of Service (LOS) to the transportation network, as described below, should be provided.	Southwest Region Staff
7	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	Two public grade crossings are on major city streets near the intersection with SR 432 and/or SR 433. California Way is classified as a Minor Arterial and Oregon Way is a Principal Arterial. Additionally, Oregon Way is the primary route between Rainier and other Oregon communities and various services in the Kelso/Longview area. WSDOT believes that train traffic over these crossings would back traffic up to, and impact the state highways. Additional analysis of the impact to the Level of Service (LOS) to the transportation network, as described below, should be provided.	Southwest Region Staff
8	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	The four private grade crossings serve industries across the tracks from SR 432. These crossings are immediately adjacent to SR 432, and there is essentially no queueing space between the railroad and the state highway. Trucks utilize these crossings as they serve these industries. Additional analysis of the impact to the Level of Service (LOS) to the transportation network, as described below, should be provided.	Southwest Region Staff

Attachment --WSDOT Comments on the Millennium Bulk Terminals-Longview Draft EIS

#	Chapter & Section (page number)	Comment	Reviewer
9	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	According to the DEIS, two peak hour trains are predicted in 2028. Additionally, the following circumstances could bunch up trains: • Freight trains don't run on a schedule. They run randomly. Even if they are spaced as they leave the coal mine, trains are delayed for numerous reasons, reducing the space between trains. • Railroads often "fleet" trains in single-track territory. In order to increase track capacity, they will run multiple closely spaced trains in one direction, then run multiple closely spaced trains in the other. By doing so, multiple trains could run on the same section of track at the same time, as they are going in the same direction. • Part of the improvements proposed by the LVSW is CTC dispatching and track upgrades. This would allow closer spacing of trains. WSDOT is concerned that trains could be stacked, not permitting vehicle queues at crossings/intersections to clear between trains. Please provide additional analysis.	Southwest Region Staff
10	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	The proposed coal terminal at Cherry Point will not be permitted by the United States Corp of Engineers. Will that cause pressure to add more trains to the Millennium project? If so, the traffic impact analysis should be revised accordingly.	Southwest Region Staff

Attachment --WSDOT Comments on the Millennium Bulk Terminals-Longview Draft EIS

#	Chapter & Section (page number)	Comment	Reviewer
11	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	As noted above, LVSW may make improvements if and when it determines these improvements are warranted. These improvements would result in an increase of the speed limit in this area from 10 MPH to 25 MPH, and permit trains to be spaced closer together. The higher speed limit would result in a shorter gate-down time at the crossings. Table 5.1-4 of the DEIS lists estimated train passing time and speed at several grade crossings, both with and without the proposed track infrastructure improvements. This table shows trains crossing Oregon Way and Industrial Way at 20 MPH. However, even with the proposed rail improvements, these speeds and times are optimistic. There are no plans to increase the speed limit of the railroad bridge over the Cowlitz River above the current 10 MPH. Likewise, the train speeds would be limited at the Millennium site. A westbound train would not be able to accelerate above the 10 MPH limit over the bridge until the end of the train has cleared the bridge. These trains will be 125 cars long with 3 locomotive units. The total length is 6,844 feet per Table 5.1-2. Therefore, the front of the train would be 1.3 miles past the bridge before it could accelerate. Likewise, at the Millennium end, the rear of the train would be 1.3 miles east of the speed restriction as the front of the train enters the coal terminal. The distance between the west end of the Cowlitz River Bridge and the entrance to the coal terminal is six miles. WSDOT believes that it is unlikely that a loaded coal train will significantly accelerate in that short distance only to slow down again. Please provide the analysis that trains can and will actually be travelling at speeds up to 20 MPH at these crossings. If this will not be the case, please determine how fast they will be travelling at these crossings and analyze the impact at these crossings and the adjacent intersections. Are there future improvements planned at the Cowlitz River Bridge? If so, they need to be included in the analysis.	Southwest Region Staff

Attachment --WSDOT Comments on the Millennium Bulk Terminals-Longview Draft EIS

#	Chapter & Section (page number)	Comment	Reviewer
12	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	Page 5.3-13 of the DEIS notes that vehicle queuing will extend to nearby intersections. However, there is no analysis of these intersections, nor is there an analysis of the impacts to the streets that cross at these intersections. Likewise, Page 5.3-32 analyzes the delay of vehicles at the railroad grade crossings, but not at the nearby intersections. The grade crossings of SR 432 (3rd Ave.) SRMP 7.19 and California Way are very close to each other, and both crossings would be blocked simultaneously. In addition to impacting these roads at the grade crossings, train crossings would also impact the intersection of California Way and Industrial Way (SR 432) and 3rd Ave. (SR 432) and Industrial Way, as well as other nearby intersections. Likewise, the grade crossings of Oregon Way and SR 432 (Industrial Way) MP 5.90 are very close to each other, and both crossings would be blocked by a train simultaneously. This would severely impact the intersection of Oregon Way and Industrial Way. Therefore, WSDOT requests the analysis to include all queuing information for the interim and full build out scenarios and the associated LOS.	Southwest Region Staff
13	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	A discussion of delay to emergency vehicle response is on Page 5.3-36 of the DEIS. The total gate downtime would increase 130 minutes per day at the public crossings. The DEIS should disclose that the Oregon Way crossing is the only practical route between Rainier and other Oregon communities and medical facilities in Longview. This may warrant a change in the indirect impacts study related to Social and Community Cohesion and Public Services (Chapter 3.2 of the DEIS). Also, multiple accesses to the Weyerhaeuser mill could easily be blocked at the same time by the same train. Please provide a response on how emergency service response time and access can be mitigated in the interim and full build out scenarios.	Southwest Region Staff
14	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	Pedestrian and bicycle safety at highway intersections impacted by increased vehicle delay needs to be analyzed, and mitigation discussed in the DEIS.	Southwest Region Staff
15	Chapter 5: Operations: Existing Conditions, Project Impacts, and Potential Mitigation Measures	Given our concerns identified above, WSDOT believes that the impact of this development will be significantly greater than identified in the DEIS, and the proposed mitigation measures on Pages 5.3-41 and 5.3-42 are inadequate. WSDOT respectfully requests additional mitigation based on the additional analysis identified above.	Southwest Region Staff

Attachment --WSDOT Comments on the Millennium Bulk Terminals-Longview Draft EIS

#	Chapter & Section (page number)	Comment	Reviewer
16	5.3.3.2 Railroad Crossing Performance Measures (5.3-11)	What is the basis for 0.04 (i.e., 1 crash every 25 years) to be the safety threshold? The methodology or precedent used to establish this should be clarified. Accident Prediction Model (AMP) is a prioritization tool for allocation of funds between safety projects. The EIS should be cautious in suggestion that an AMP threshold would define a safe versus unsafe crossing.	Ahmer Nizam
17	5.3.5.1 Statewide Study Crossings - Increase Predicted Accident Probability on BNSF Main Line Routes beyond Cowlitz County (5.3-40)	Same comment as in Vehicle Transportation Chapter - please explain the basis for the 0.04 threshold.	Ahmer Nizam
18	Chapter 6: Cumulative Impacts	Implementation of mitigation measures is unclear. Mitigation measures should be discussed in greater detail.	Jason Beloso
19	Chapter 6: Cumulative Impacts	The DEIS uses 2038 as the analysis year for cumulative impacts (6-2). It is conceivable that the coal terminal could be fully operational and at peak capacity much sooner than this date. While the impacts may not necessarily be different, the timeline for impact mitigation would be. This scenario should be analyzed.	Chris Herman
20	Chapter 6: Cumulative Impacts	Cumulative Impact Locations (Figure 6-1) are constantly evolving. While it may be impossible to accurately document this, discussions related to mitigation should be constrained by the proposed projects that are moving forward.	Chris Herman
21	Chapter 6: Cumulative Impacts	The cumulative impacts analysis should include the use of Steven's Pass as a viable alternative for some increased train volume frequencies (page 6-38).	Chris Herman
22	Chapter 6: Cumulative Impacts	Neither of the projects identified in the cumulative impacts section for both the Reynolds Lead and the BNSF Spur continue to be considered (pages 6-36 and 6-40). This section should be updated to include this information.	Chris Herman
23	6.3.3.3 Analysis Scenarios (6-42)	Please clarify that the 'no action' scenario refers solely to the Millennium proposal.	Ahmer Nizam
24	6.3.3.3 Performance Measures (6-45)	Same comment as in Vehicle Transportation Chapter - please explain the basis for the 0.04 threshold.	Ahmer Nizam

Attachment --WSDOT Comments on the Millennium Bulk Terminals-Longview Draft EIS

#	Chapter & Section (page number)	Comment	Reviewer
25	6.3.3.3 Vehicle Queuing (6-48)	Will there be new impacts related to vehicle queues extending from nearby intersection, back over the tracks (i.e., the need to assess installation of traffic signals under MUTCD Warrant 9, and/or arranging for railroad traffic signal preemption)?	Ahmer Nizam
26	6.3.3.3 Statewide Study Crossings (6-53)	Does this factor in warning device activation times - such as with gates crossings where the gates descend in advance of the arrival of the train?	Ahmer Nizam

STATE OF WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION
1300 S. Evergreen Park Dr. S.W., P.O. Box 47250 • Olympia, Washington 98504-7250
(360) 664-1160 • TTY (360) 586-8203

June 13, 2016

Millennium Bulk Terminals EIS
c/o ICF International
710 Second Avenue, Suite 550
Seattle, Washington 98104

RE: Environmental Impact Statement Comments
Millennium Bulk Terminals

Dear Cowlitz County and Department of Ecology:

The Washington Utilities and Transportation Commission (commission) appreciates the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the proposed Millennium Bulk Terminals– Longview (MBTL) project in Longview, Washington.[1] The commission's role in this proceeding is limited to providing comments on the DEIS elements relating to the safety of rail transportation in Washington.

The facility, as proposed at completion, is a coal export facility capable of receiving 44 million metric tons of bulk coal per year by train, storing and blending coal onsite, and loading the product onto marine vessels for delivery to international customers. BNSF Railway Company (BNSF) and Union Pacific Railroad (UP) trains would transport coal in unit trains on BNSF main line routes in Washington to Longview Junction in Kelso, Washington. Longview Switching Company (LVSW) would transport the unit trains from Longview Junction to the proposed project site, a total distance of about seven miles, via the existing BNSF Spur and Reynolds Lead lines. At full build-out, an average of approximately 16 unit trains (eight loaded and eight empty) would travel the spur and lead lines each day.

The commission's primary concern with the proposed project is its ultimate impact on public safety. One aspect of public safety is the probability of more vehicle-train collisions at public

[1] The commission has responsibility under state law for regulating, inspecting, and establishing standards for safety at more than 2,800 public railroad crossings in Washington and private railroad crossings located on routes that carry crude oil tanker cars. The commission also reviews and has approval authority over the construction of new crossings, and alteration, modification, or closure of existing railroad crossings. In addition, the commission partners with the U.S. Department of Transportation Federal Railroad Administration (FRA) and employs FRA certified inspectors to perform inspections in transporting hazardous materials; signal and train control; track; operating practices; and motive power and equipment in support of FRA's regulatory and inspection program.

railroad-highway grade crossings in Washington due to increases in rail traffic. Accordingly, the commission has worked extensively with BNSF and UP over the past few years on the unique issues related to safely transporting energy products, such as crude oil and coal, by rail. The companies have been cooperative in the commission's efforts to address specific concerns relating to the safety of the citizens of the state at public and private crossings and during commission inspections of track, hazardous materials, equipment, signal and train control and operations. The commission generally agrees with the description and impact of coal transportation by rail in the DEIS and the various proposed mitigation measures as they relate to BNSF and UP.

The commission has had far less contact with LVSW and virtually none related to the safe transport of energy products. Our comments therefore, will be generally directed towards the portions of the DEIS that deal with the safe transport of coal unit trains from Longview Junction to the project site by LVSW via the BNSF Spur and Reynolds Lead.

I. DEIS Accident Probability Analysis

The DEIS includes an accident probability analysis conducted on all BNSF mainline public crossings in Cowlitz county; some statewide BNSF mainline public crossings that were apparently identified by the Washington State Department of Transportation as being on or near state highways, and the five LVSW public crossings affected by the proposed project. (See SEPA Vehicle Transportation Technical Report at 2.1.2.7, page 2-12 and Vehicle Transportation 5.3.3.2, pages 5.3-13 & 14).

The accident probability analysis consists almost entirely of using the Federal Railroad Administration (FRA) GradeDec.Net web-based software to estimate the predicted annual accident probability at each crossing in the study. The commission has no concerns with the use of this software for initial analysis. It is a tool sponsored by the FRA that is used nationally by railroad safety specialists, including commission staff, for a wide variety of applications. However, the GradeDec.Net software is of limited analytical value on its own. Rather, this software was designed as an investment planning tool. It was intended to be used by planning, policy, and investment decision makers to evaluate the benefits and costs of various crossing upgrades, grade separations, and crossing closures. It can be used for other purposes, as it is in the DEIS, but only in combination with other site-specific information, and an on-site safety review by local road authorities (e.g., city of Longview), the railroad, commission staff and other interested parties.

While the analysis in the DEIS has produced some preliminary results, the commission does not believe that the results of the analysis can be considered determinative in deciding whether additional safety devices are necessary at the five public LVSW crossings. The GradeDec.Net model captures limited data elements and produces onlybasic potential starting point results. For instance, the model captures such things as accident history (five years), train and traffic volumes, level of protection, and number of roadway lanes, but does not capture other site specific characteristics such as approach grades, angle of crossing, train and vehicle speeds, and available sight distances. The DEIS rationalizes the importance of these critical elements by stating that "the accident history at these crossings would likely reflect these characteristics."

(Vehicle Transportation, Section 5.3.3.2, Impact Analysis, page 5.3-13). Yet, this statement may or may not be correct: One may expect accident histories at crossings to remain consistent, but the addition of increased rail traffic, congestion at the crossings and continued growth in population could potentially alter the risk in a way that is not consistent with past accidents. The commission urges on the county and Ecology to reject conclusory statements that make assertions on safety without reference to any definitive analysis or academic studies on the subject.

The analysis is further compromised by the use of an unattributed performance measure. In the Vehicle Transportation section at 5.3.3 (Methods) page 5.3-14, the DEIS states, "Based on other applications of the model, a vehicle safety impact was defined as a study crossing that would have a predicted accident probability above 0.04 under the Proposed Action that would be at or below 0.04 under the No-Action scenario." Further, the SEPA Vehicle Transportation Technical Report at 3.1.1.3, page 3-21, states, "For this analysis, a predicted accident probability of 0.04 per year, or one every 25 years, was used as a performance measure for when grade-separation should be considered at study crossings for safety reasons. This was based on a peer review of similar applications of the FRA GradeDec.Net module."

The commission is unfamiliar with this measure and, since it is unattributed, is unable to attest to the validity of its use as a performance measure in the DEIS. The U.S. Department of Transportation, Federal Highway Administration, determined one of the criteria for considering *active devices with automatic gates* is an expected accident frequency as calculated by the USDOT Accident Prediction formula, including a five-year accident history, exceeding 0.075 per year. To be considered for *grade-separation*, the expected accident frequency would be 0.5 per year, or one predicted accident every two years. (See Guidance on Traffic Control Devices at Highway-Rail Grade Crossings, November, 2002, at pages 29 and 30, and Railroad-Highway Grade Crossing Handbook, August, 2007, at pages 149 and 151). To give these numbers context, in Washington there are 78 public crossings (out of 2,800 total public crossings) that currently exceed the 0.04 threshold. There are 25 that exceed 0.075; and no crossing exceeds 0.5. The commission strongly supports crossing safety and would not oppose consideration of grade separation but wants to ensure consistency in the methodology and parameters of grade separation discussions to ensure efforts are focused on those projects that are in greatest need.

Using the previously mentioned performance measure of predicted accident probability, .04 accidents per year, the increased train traffic would result in an adverse vehicle safety impact at the 3rd Avenue crossing (USDOT #101826T).[2] The analysis shows that predicted accident probability would be above 0.04 accidents per year if the proposal and associated increased train traffic is approved. The commission is concerned that there is no related mitigation measure proposed to address the increased risk and there is no apparent recognition of the finding as an Unavoidable and Significant Adverse Environmental Impact at 5.3.8, pages 5.3-42 & 43 beyond the statement, "The Proposed Action would also result in a vehicle safety impact at the 3rd Avenue crossing of the Reynolds Lead." If the DEIS is adopting a performance measure that would classify a crossing as being higher risk and require thorough consideration of grade separation, there should be a mitigation measure or a reference in the section on Unavoidable and

[2] Vehicle Transportation Section at 5.3.5.1 (Proposed Action), page 5.3-36

Significant Adverse Environmental Impact noting the impact and its significance. Without these changes, the commission does not believe the project should move forward.

II. Commission Crossing Analysis

The commission accepts the analysis related to BNSF crossings in Cowlitz County and elsewhere in the state. The commission is very familiar with these crossings, having completed its own analyses for other purposes, and is currently working with stakeholders on a number of crossing improvement projects along the same routes as identified in the DEIS. However, the commission does have significant concerns whether the analysis in the DEIS adequately assesses the safety impact of the Proposed Action on the five affected LVSW crossings.

Commission staff conducted its own independent assessment of these LVSW crossings, including review of FRA and commission crossing inventory records and inspection reports, and a preliminary on-site crossing safety review. It found that the five public crossings are adequately protected for current levels of train and vehicle traffic. Although some of the signal equipment is dated, it is still functional and the crossings are in general compliance with state law, commission rules, and the Manual on Uniform Traffic Control Devices (MUTCD) 2009 edition. However, LVSW's analysis does not address the adequacy of safety measures in light of the considerable increase in train traffic that will result from the proposed project.

III. Applicant Proposed Mitigation Measures

In the DEIS, the Applicant offered to fund installation of crossing gates at the Reynolds Lead crossing of Industrial Way "to mitigate the safety impacts from increased rail traffic, before beginning operations." (Vehicle Transportation, Section 5.3.7.1, Voluntary Mitigation, Page 5.3-42). The commission appreciates the Applicant's willingness to fund this improvement at the Industrial Way crossing voluntarily. However, the commission believes more specific language, including an evaluation of the condition of existing signal equipment to ensure the crossing meets safety standards, is necessary.

The process for ensuring the crossings are being properly evaluated for necessary safety measures is important. In addition, in response to increased train horn noise created by the 16 additional train trips along the Reynolds Lead line, the Applicant is willing to fund upgrades to crossings where train horn noise has been identified as severe, particularly in several residential areas. See Voluntary Mitigation at 5.5.71 "To reduce rail noise along the Reynolds Lead, the Applicant will work with LVSW and other stakeholders to convert the Oregon Way and Industrial Way crossings to "quiet crossings". The Applicant will fund additional electronics, barricades, and crossing gates to convert the crossings to "quiet crossings." The commission highlights that there are specific threshold requirements outlined in the Code of Federal Regulations, Title 49, Part 222 to qualify for quiet zones. The Applicant should be responsible for these costs and special consideration should be given by the crossing assessment team when evaluating these crossings for upgrades.

The commission believes that it would benefit all parties to convene on-site safety reviews and assessment of the current signal equipment for each of the five LVSW public crossings before, or in conjunction with, Stage 1a (start-up operations).

IV. Recommended Changes to DEIS

1) In the Vehicle Transportation section at 5.3.3.2, page 5.3-14, the DEIS states "Based on other applications of the model, a vehicle safety impact was defined as a study crossing that would have a predicted accident probability above 0.04 under the Proposed Action that would be at or below 0.04 under the No-Action scenario." Add a footnote specifically identifying the other applications of the model relied upon. Alternatively, use performance measures based upon measures identified in U.S. Department of Transportation, Federal Highway Administration publications mentioned previously.

2) In the SEPA Vehicle Transportation Technical Report at 3.1.1.3, page 3-21, the DEIS states "For this analysis, a predicted accident probability of 0.04 per year, or one every 25 years, was used as a performance measure for when grade-separation should be considered at study crossings for safety reasons. This was based on a peer review of similar applications of the FRA GradeDec.Net module (sic)." Add language specifically identifying the similar applications of the FRA GradeDec.Net Module and each specific peer review relied upon. Alternatively, the Applicant must use performance measures identified in U.S. Department of Transportation, Federal Highway Administration publications mentioned previously.

3) In the Modify Applicant Mitigation in the Rail Transportation section at 5.1.7.1, page 5.1-23, MM RT - 1 and in the Rail Safety section at 5.2.7.1, page 5.2-10, MM RT – 1, include the commission as an entity that would receive the required report. Currently, this section reads "To address potential impacts to rail capacity on the Reynolds Lead and BNSF Spur, the Applicant will coordinate with LVSW before each identified operational stage (Stage 1a, Stage 1b, and Stage 2) that change average daily rail traffic on the Reynolds Lead and BNSF Spur. The Applicant will prepare a report to document the coordination with LVSW and changes to average daily rail traffic. The report will be submitted to LVSW and Cowlitz County at least 6 months before the change in average daily rail traffic." The last sentence in both sections should be reworded to "The report will be submitted to LVSW, Cowlitz County and the Utilities and Transportation Commission at least 6 months before the change in average daily rail traffic." The commission should be notified of these changes in average daily rail traffic so that the inspection work of our FRA certified inspectors can be redirected, as necessary.

4) In the Vehicle Transportation section at 5.3.7.1 – Voluntary Mitigation, page 5.3.42, the second bullet reads "To mitigate the safety impacts from increased rail traffic,

before beginning operations, the Applicant will fund installation of crossing gates at the Reynolds Lead crossing of Industrial Way." The sentence should be reworded as "To mitigate the safety impacts from increased rail traffic, before beginning operations at Stage 1a (start-up operations), the Applicant will fund replacement of existing active warning devices at the Reynolds Lead crossing of Industrial Way (USDOT # 101806G) with shoulder-mounted LED lights and gates." Commission staff notes that the signal cabinet at this crossing is antiquated and will likely need to be replaced in conjunction with installation of new signal equipment.

5) The commission recommends that the Applicant, as part of its required mitigation in the Vehicle Safety section, convene a safety review team consisting of representatives of the Applicant, LVSW, city of Longview, commission staff and other interested parties prior to or in conjunction with Stage 1a (start-up operations). The purpose of the team is to recommend safety improvements at the other four LVSW public crossings and determine what is necessary to create a quiet zone under federal rules. The Applicant should be required to fund safety upgrades recommended by the team, such as replacing eight-inch lenses with the current standard of 12 inch; replacing incandescent lenses with LED lenses; and making appropriate changes to warning signs and pavement markings.

The proposed MBLT project will significantly increase rail traffic in the surrounding area and, indeed, across the state. The safety measures developed and implemented must be sufficient to address this increased traffic. The commission urges Cowlitz County and Ecology not to move forward with this project without the recommendations above.

Sincerely,

Steven V. King
Executive Director